ENGINEERING AND MINING JOURNAL

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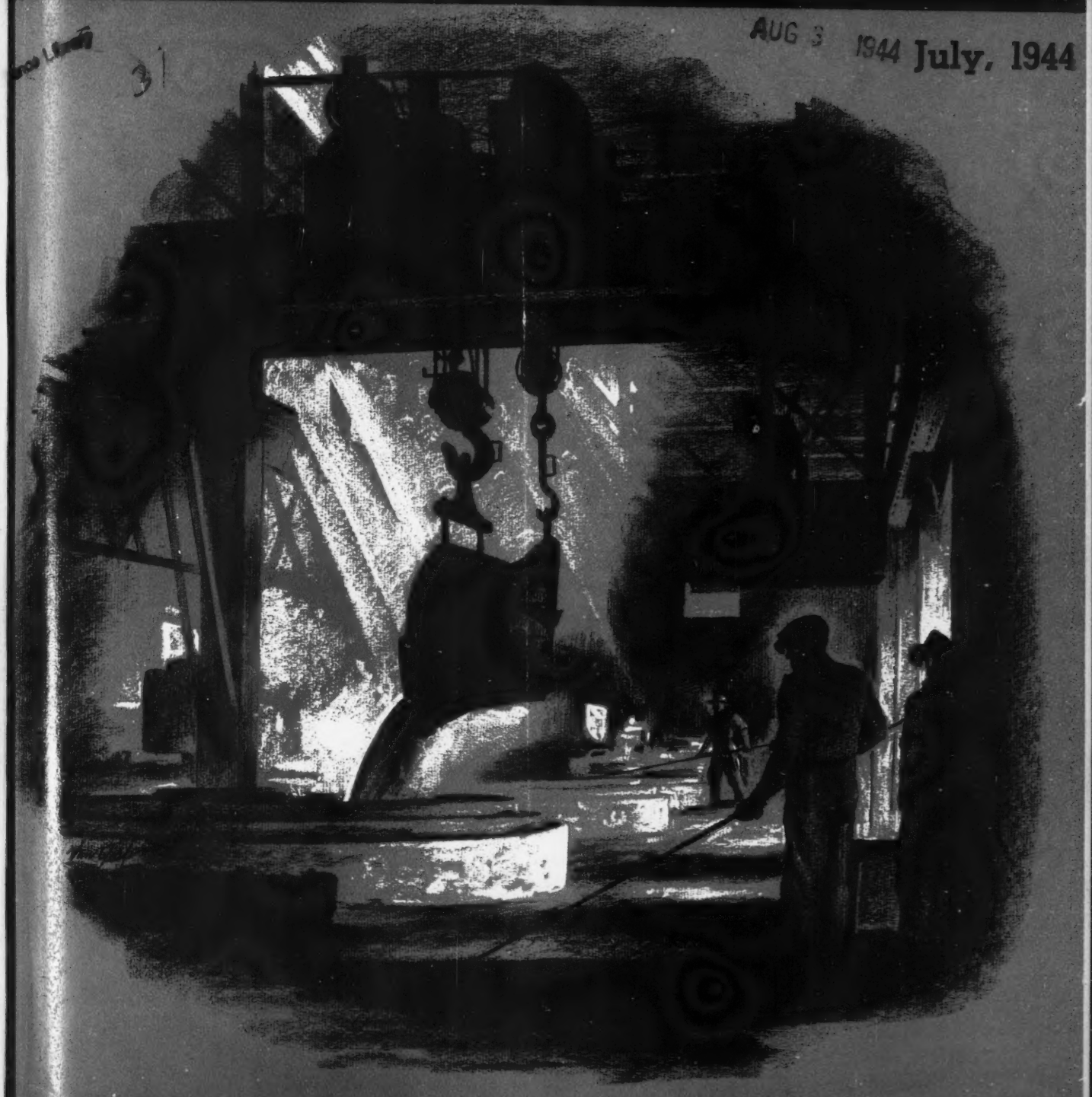

Morris Mine's Water Problem

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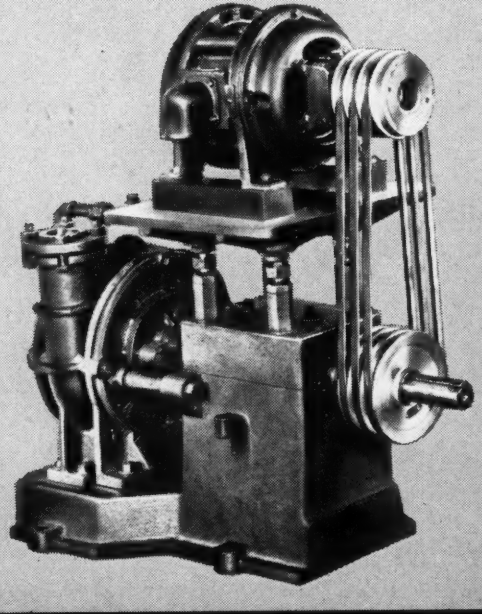

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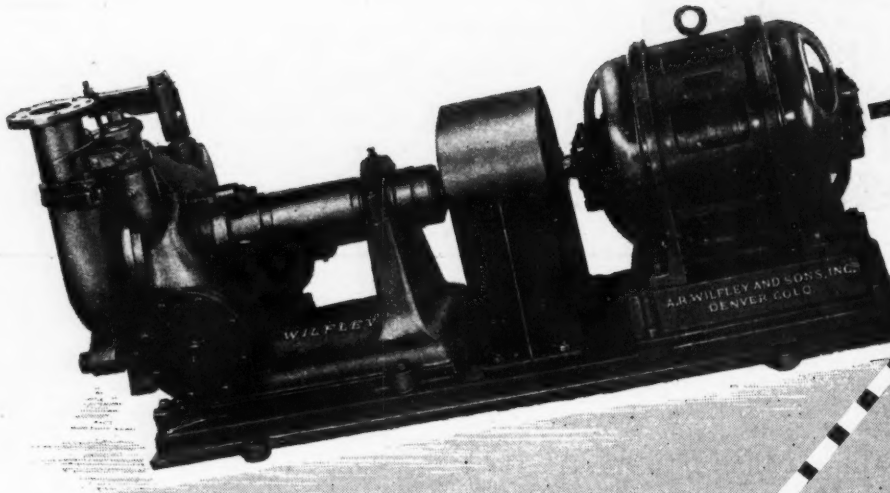

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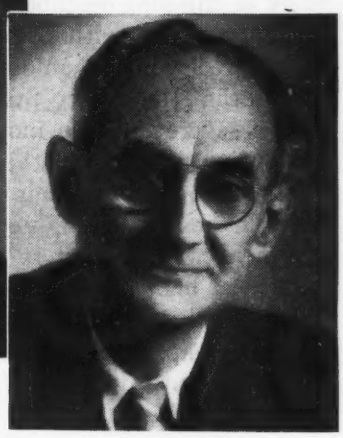
Evan Just, Editor

Announcement

EVAN JUST



H. C. PARMELEE

H. C. Parmelee has retired as editor of *Engineering and Mining Journal* and has been succeeded in that position by Evan Just.

Mr. Parmelee joined the McGraw-Hill Publishing Company in 1910 as Western editor of *Chemical and Metallurgical Engineering*, with headquarters in Denver. Since that time he has served the company continuously, except for an interim of one year, in 1916–17, when he was president of the Colorado School of Mines. In 1918 he became editor of *Chem. & Met.*, relinquishing that post in 1928 to become editorial director of the McGraw-Hill Publishing Company. He has been editor of *E. & M. J.* since 1933, and retires as editor emeritus after 34 years of editorial service in the company.

Mr. Just comes to the editorship of *E. & M. J.* with a wide experience in the mineral industries in the United States and abroad. He graduated from Northwestern University in 1922, and received his master's degree in geology from the University of Wisconsin in 1925. His field experience has included exploration and examination for mining and oil companies in the United States, Canada, Brazil, and Russia. In the last-named country he spent a year as geologist and drilling supervisor examining bauxite deposits for the Aluminum Company of America. Subsequently he was division engineer for the Carter Oil Company, an affiliate of the Standard Oil Company of New Jersey. His travels have taken him through Finland, Sweden, Denmark, Great Britain, France, Switzerland, Italy, Egypt, China, and Japan. In the educational field he has served as instructor in geology at Lehigh University and as assistant professor of geology and petroleum technology at the New Mexico School of Mines. For six years prior to joining the staff of *E. & M. J.* in May, 1942, he was secretary of the Tri-State Zinc and Lead Ore Producers Association, functioning principally in the fields of public relations and mineral economics.

Who Killed the Golden Goose?

As described elsewhere herein (p. 77), a famous name in mining has been shelved—we hope not permanently. Alaska Juneau, one of the wonders of the mining world because of the efficiency which enabled it to treat the lowest-grade gold-quartz ores mined anywhere, has been closed down. The reason is not final depletion or military necessity; it is because representatives of the workmen made wage demands that simply could not be met and the demands were enforced by a mandate from the War Labor Board. There was nothing else for the harried management to do but shut down.

Alaska Juneau was an important institution. Under the prudent guidance of its leaders, it provided jobs for 1,000 to 1,500 men at good wages for a long period, through good times and bad. It was the largest enterprise in the region of Juneau, and its payroll was a major factor in the prosperity of the community. Its purchases afforded business to many manufacturers. Its moderate dividends provided steady income to a large number of stockholders. The operation stimulated the development of mining in Alaska and pioneered many aspects of the treatment of low-grade gold ore. It produced ever-new supplies of the magic metal which since time immemorial has symbolized stabil-

ity and value amid the shifting scenes of civilization's uncertain growth.

It would be very interesting to know better what goes on in the minds of men who support demands that destroy their livelihoods and seriously injure their community. Also, it would be instructive to understand how a government tribunal can justify dealing a lethal blow to a valuable industrial enterprise whose payroll may be sorely needed before long. At this distance we shall not presume to judge who was at fault. Whoseoever the fault, the result is a monument to folly.

Breakers Ahead on Cutbacks

IT WOULD TAKE ONLY SLIGHT EXPERIENCE with human reactions to prove that the handling of cutbacks is going to be a thankless job. Thus it is evident that those hardy souls who remain in WPB and Metals Reserve to administer the wormwood will experience a steep decline in their popularity curves. It is likely to be a far different experience from being part of the crew on a "gravy train." Nevertheless, it is important that the responsibility be lodged in capable hands.

The viewpoint of affected domestic parties is condensed in the following statement from Senator Scrugham's subcommittee of the Senate Committee on Small Business:

"It is recommended that domestic mineral and metal production be given preferential treatment by the Government over imports. As far as is possible and compatible with the best conduct of the war, domestic metals and minerals should be utilized first. When the rate of consumption plus necessary additions to stockpiles falls below the rate of imports plus domestic production, cutbacks should first be made in imports and cutbacks in domestic production should be ordered only when the rate of consumption falls below the rate of domestic production. Full consideration should be given to the advisability of maintaining domestic industry even when the cost of the domestic raw material appears to be somewhat higher than imported raw material. Taxes, consumption of materials, and jobs are the outcome of expenditure within the United States. Raw materials should be imported by the Government only when there is a real shortage of domestic products and when such importation is necessary for the conduct of the war."

Faced with this attitude on the domestic side, the cutback administrator finds no bed of roses among the good neighbors outside our borders. In fact many of the said neighbors are downright angry at Uncle Sam, not without reason, for cutting them back more severely than domestic producers. Their view is that the United States is largely responsible for the severe inflation most of them are enduring, by pouring money into their economies while withholding goods from their markets. They believe that our domestic producers have enjoyed better treatment with respect to equipment and supplies, as well as higher prices and subsidies. Now they find themselves suffering more severe cutbacks and facing unemployment. They are swollen to the bursting point with money, but goods are scarcer than ever. With greatly expanded wages, their common people are worse off than before, as attempts to control prices and profiteering have been unsuccessful. Small wonder that their good neighborliness is wearing thin in spots, that the profligate manner in which our agents have thrown money around is unappreciated, and that they are looking forward to building up their self-sufficiency after the war.

Thus, we pity the brethren who have to reconcile these opposing domestic and foreign viewpoints, and disappoint both sides. We face times in which all of us can lend a hand by trying to appreciate the complexity of the problems which must be solved.

Wouldn't It Be Wonderful!

WE ARE THINKING of this silver business. To one of our editors an important Treasury official recently stated that the Treasury was not anti-silver, but in fact Secretary Morgenthau had done a great deal to help silver. He said that bimetallism was infeasible nevertheless, because the governments of the traditionally silver-using countries were indifferent to its re-establishment as a currency base.

In view of these statements, it was a considerable letdown to read in the trustworthy *New York Times* that the "Treasury will resist efforts by some countries to include silver as an international monetary medium in the agreements reached at the Bretton Woods, N.H., Monetary and Financial Conference." This statement was made after the Mexican and Chinese finance ministers had visited Secretary Morgenthau.

The *Times* also criticized the American delegation to the conference for leaving out internationally recognized authorities such as Kemmerer and Anderson in favor of some "lightweights." Presumably those chosen were selected because they will stand with bated breath while Morgenthau, White, *et al.* try to stage the greatest juggling act ever attempted.

An Associated Press dispatch from Bretton Woods

on July 3 stated that the American delegation would present a solid front against the appeal of a number of senators and congressmen that bimetallism should be considered by the conference. Are these delegates representing the Treasury or the people?

One of the "authorities" among the delegation, Representative Jesse Wolcott, of Michigan, speaking of bimetallism, said, "I certainly don't think that now is the time to put into effect any untried and unknown monetary theories." It is evident that the stage has been carefully set to give silver the "bum's rush." Otherwise we would call to Mr. Wolcott's attention that nothing could betray ignorance of monetary matters more completely than his statement. We might also ask him what the conference is all about, anyway, if no untried and unknown monetary theories are contemplated.

But to get back to the Treasury, it seems to us that this "double talk" on silver by Treasury officials and the hand picking of the delegation indicate that both gold (*E&MJ*, June, p. 68) and silver are being sold down the river, despite the fact that most people in this country are against fiat money. Wouldn't it be wonderful—and reassuring—if the utterances of high officials had as much head and tail as a good old silver dollar!

Well Done, Senator George

ONE OF THE MOST LUCID and constructive public documents it has been our privilege to read was published in mid June by Senator George's Committee on Postwar Economic Policy and Planning. Citing the tremendous growth in our industrial capacity and the necessity of providing employment for 55,000,000 workers after the war, the report goes on to define the logical part of government in our postwar economy. The committee urges policies that will give confidence to investors, including tax revisions that will permit business to function. It favors efficient demobilization, quick settlement of war contracts, discreet handling of surplus plants and materials, adequate unemployment compensation, and relaxation of government controls as rapidly as is feasible. It recommends study of the monopoly problem and makes pointed reference to harassing business "by unjustified monopoly prosecutions." It also urges elimination of overlapping functions by government agencies and that Congress should consider reclaiming the broad powers delegated to the Executive Branch.

"The mass purchasing power necessary to maintain a healthy mass production must come from the American people in purchases of consumer and capital goods. If it does not come from them, mass production cannot be maintained except through subsidized exports and governmentally supported public works programs. Either of the latter tends to impose a heavier tax burden which in turn takes away incentive to production and provides a far less healthy economy than is provided by mass purchasing power resulting from full employment by private enterprise. The whole problem of full production and full employment is and must be a circle. It has no beginning and no ending. If either declines, the circle merely contracts. . . .

"Employment of 8,000,000 to 10,000,000 more people than have ever before been employed in America and absorption thereafter of approximately three-quarters of a million people annually into the labor force must be America's goal. It presents a challenge almost as grave as the challenge of the war. . . .

"Without a proper 'economic environment,' without confidence in the friendly attitude of Government, without reasonable certainty that a minimum number of simple rules of the game will not be changed except upon great provocation, without relief from an increasing number of departmental directives—many of them conflicting—without a certainty that the Congress will delegate the absolute minimum of its powers and those under well-defined conditions, without assurance that legislation and administration will not discriminate in favor of any segment of the economy, without a well-defined fiscal policy, business will not be willing to go forward and expand. It will not be willing to spend its reserves for new facilities. It will not be able to secure new equity capital. The investor will continue to seek the lesser profits of security rather than the greater gains of risk. Ownership will not be attractive. Savings that should spark the expansion of private enterprise will be hoarded and become valueless in increasing and absorbing production.

"Confidence on the part of the consuming public is equally important. A consumer who is fearful of his economic future will live from hand to mouth, with a possible 'rainy day' uppermost in his mind. He is a customer of American business only to the minimum degree necessary to keep body and soul together. He offers no outlet for new automobiles and refrigerators and radios and the myriad luxuries that should arise from the technological advancement of this war. . . .

"It therefore seems fundamental that the first consideration in the shaping of governmental policies should be to inspire confidence on the part of management, the investor, the employee and the consumer. The whole problem of monopoly legislation should be carefully studied and clarified to the end that monopolies can be adequately punished but to the end also that business may know clearly just what is and is not prohibited and may not be harassed by unjustified monopoly prosecutions."

To all these statements we say "Amen" and recommend the document for our readers' attention.

Handling the Water Problem at Morris Mine

PETER P. RIBOTTO, *Chief Engineer, Iron Mining Department, Inland Steel Co., Ishpeming, Mich.*

A program of water control unusual in mining operations has been pursued by Inland Steel Co. at its Morris mine, in northern Michigan. Diversion ditches on surface, deep-well pumping above the ledge, and temporary measures underground to alleviate the results of wet conditions, are employed in an integrated scheme, the progress of which is checked by keeping careful records of the water handled.

AT ITS MORRIS MINE, the Inland Steel Co. has been engaged in a program of water control somewhat unprecedented in mining operations. The factors which have necessitated this program and the details of the control methods are brought out in the following discussion.

The Morris mine is on the Marquette iron range, about 4 miles west of Ishpeming, Mich. The ground worked is in the north limb of a large synclinal basin composed of sedimentaries which have been intruded and metamorphosed by basic igneous rocks. Operations here have been going on for about 30 years, during the last ten of which they have been under Inland's management.

Factors Influencing The Water Problem

The factors which, in a greater or lesser degree, have produced the water problem are: (1) climate, (2) topography, (3) local geology, and (4) the situation and the mining of orebodies.

Climate. The climate of the region is one of cold, snowy days in winter and alternate hot and cold spells with intermittent rains in summer. Total precipitation ranges from 30 to 40 in. per year. Except in extreme periods of continual abnormal rains, the effect of rainfall on underground waters is negligible. Of more noticeable effect, however, are the spring thaws. The underground water increases a small amount and the water table is raised a few inches.

To summarize the effect of climate, then, it may be said that prolonged rainfalls and spring thaws increase appreciably the total amount of surface water to be controlled.

Topography. Mining operations are conducted almost entirely under an extensive swamp area. Rock outcrops at a few spots, but most of the surface area has 50 to 150 ft. of overburden.

One fair-sized stream, the Carp River, flows over the Morris property, as shown on the accompanying surface map. There is a possibility of some seepage from the river in the area which represents underground workings on this map. In that area the iron formation outcrops at several points in the stream bed.

Several small lakes and ponds are found scattered within an area of several square miles near the Morris mine.

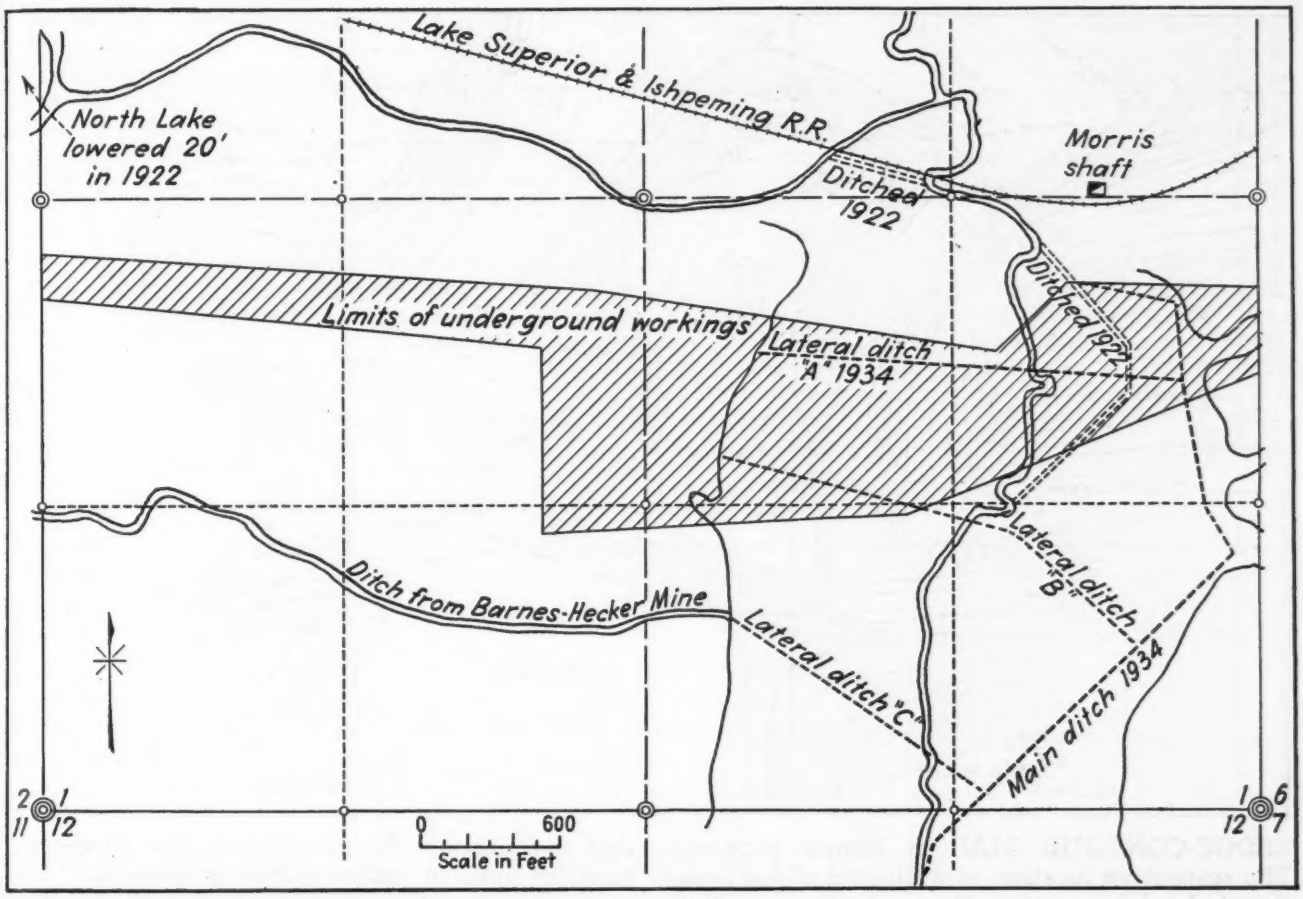
The presence of a saturated overburden plus several streams and ponds, all situated over the mining area, naturally offers a potential source of flows of water to the underground workings.

Local Geology. The dip of the north limb of the Marquette Range syncline is approximately 70 deg. south in the Morris area. This dip of the beds undoubtedly has a bad effect on the drainage situation, because the bedding planes tend to become natural drainage channels.

At the mine one of the principal factors in the deposition of the ores has been the presence of certain naturally troughing structures. These troughs are formed by the intersection of dikes with faults or by the intersection of dikes or faults with impervious beds. These same troughs today tend to convey seeping surface waters into mining areas.

The relatively great permeability of the ore as compared to the country rock is a factor of consequence. As a result, the water is soaked up by the ore and slowly released as the ore is mined.

The fact that the iron formation is less resistant to erosion than the surrounding rocks may be a partial cause for the presence of the Morris swamp area. The iron formation is eroded more deeply, forming natural basins for accumulation of water.



SURFACE MAP of Morris mine showing Carp River running east and west at top and north and south at right, with lateral ditches A, B and C and 1934 main ditch provided ocross marshy ground on right half for draining it. Shaded area indicates limits of underground workings in plan.

The accompanying ledge contour map shows one of these basins.

Location and Mining of Orebodies

The Morris orebodies have been developed to a depth ranging from several hundred feet to 1,800 ft. below the shaft collar. At that bottom elevation, the ore areas are roughly enclosed within the area indicated in the surface map mentioned. Seepage into this ore area always took place to a small extent, but the degree of seepage which presented a definite problem was eventually caused by the mining method.

The Morris ore is a soft hematite which is most readily mined by some caving method, such as top-slicing, sublevel caving, and block-caving, or by an open-stope method, such as sublevel stoping or shrinkage stoping. Open stopes used at the Morris would not remain open much after the mining ceased. The net result in any type of mining which might be adapted to the Morris ore is that the rock above the mining place will gradually break and work downward with the progress of the mining.

Several variations have been made in mining practice at the Morris mine, but, in general, mining has been done by top-slicing and sublevel stoping. The results of these methods, taking place over a period of years, are depicted in the illustration showing a cross-section of a top-sliced orebody. Results are the same for an orebody mined by sublevel stoping. After mining has progressed for some time, the country cap rock breaks up gradually to surface, resulting finally in a surface cave-in. Two such cave-ins have occurred, one in 1939 and one in 1940, shown on the ledge-contour map.

Because of existent surface conditions, the flow of water underground increased a great deal as the subsiding action leading to the cave-ins progressed. Subsidence is progressing normally now. As it increases, the territory open to surface waters is enlarged. This not only tends to increase the volume of water underground but also spreads the water over a larger portion of the mine. Therefore, as mining proceeds downward, more and more mining places become wet.

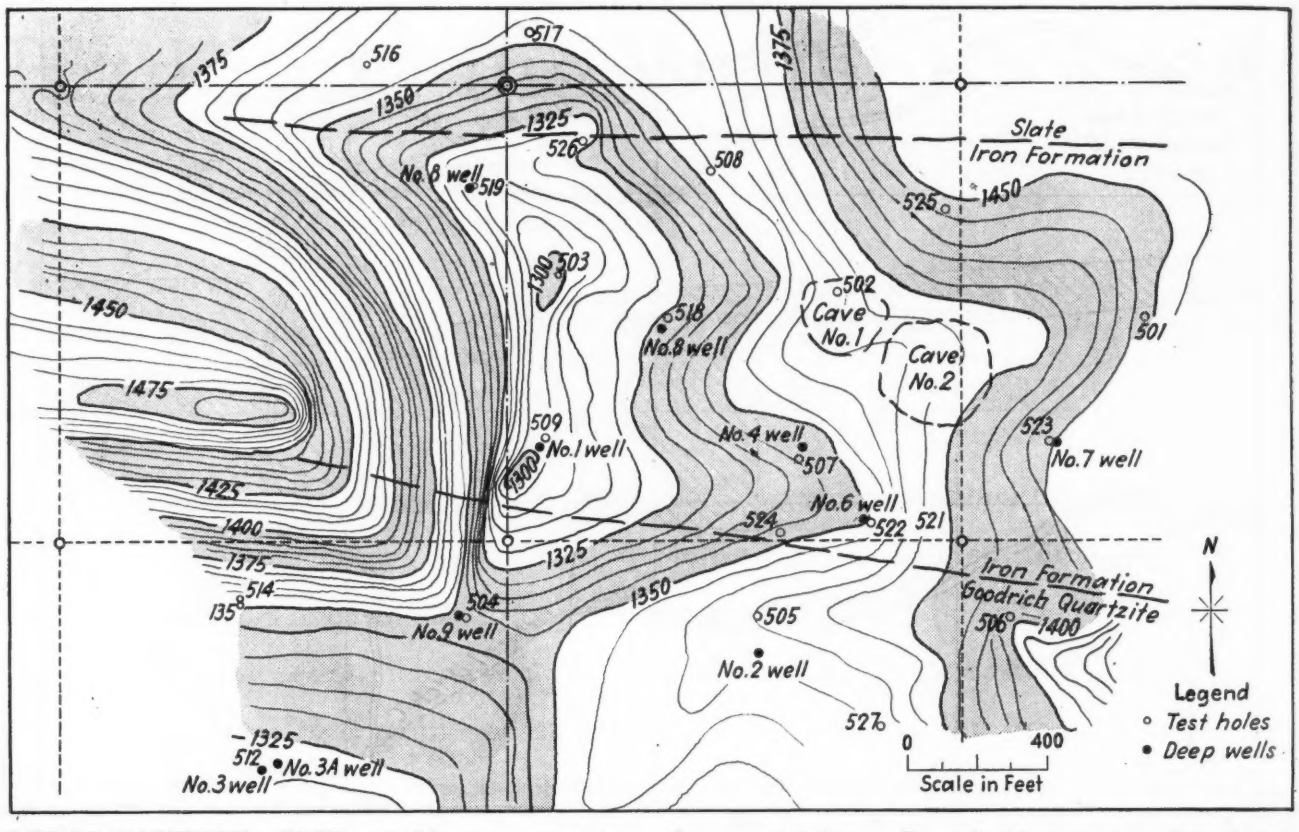
Water-Control Program

In a previous article[1] I have told what are the various types of waters encountered. These same subdivisions will be used here, namely: (1) direct surface waters, such as those in streams and lakes; (2) indirect surface waters or ground waters lying entirely within the overburden material; and (3) underground waters from the ledge on down.

Control of Surface Waters

1. ***Controlling the Inflow of Direct Surface Waters.*** The principal direct surface waters occurring on the property are the Carp River and North Lake, (see above) The first attempt to control water from this source was started in 1921. At that time, the river was dredged so as to lower the level of North Lake 20 ft. The Barnes-Hecker ditch shown was also excavated at this time in an attempt to drain some of the surface waters in the vicinity of the Barnes-Hecker mine, 2 miles west of the Morris. Also, during this period the portion of the Carp River flowing

[1] *"How to Approach the Mine Drainage Problem," E. & M. J., June, 1944.*



LEDGE-CONTOUR MAP of Morris property. The respective location of wells and of test holes that helped in spotting them are shown. Note the two surface caves resulting from subsidence due to mining. As subsidence area increases, territory open to surface waters is enlarged. See vertical section through orebody which is shown in the illustration on the opposite page.

over the iron formation was diverted to the east.

In 1934 the Inland company decided to divert the river still further east. The Carp now lies in the position designated by the heavy dash line.

So long as the Carp River continues to flow over the iron formation, it constitutes a potential problem. Further diversion to the east would be only a temporary measure. Such a project would be costly because of the unfavorable topography east of the present stream bed. Fluming the river over the iron formation would be an effective measure against current seepage, but, as the subsiding area is working to the east, the flume would eventually be affected by the movement. The subsidence would also eliminate the use of slimes or clays as a solution to the problem.

At present an extended investigation is being made to determine if it is possible to divert the entire Carp River to a different watershed north of the iron formation. Another study is being made to determine the possibility of diverting the river over a barren part of the iron formation. Incorporated in this study will be a proposal to drain North Lake completely.

2. ***Controlling the Inflow of Indirect Surface Waters.*** Controlling the waters lying within the overburden has been the most interesting phase of the water-control program at the Morris mine.

As mentioned in the previous article,[1] after a small portion of the ground water has been removed by ditching, no other method of draining the overburden remains except that of deep-well pumping. The lateral ditches "A," "B," and "C" shown in the surface map removed perhaps 15 ft. of the water but, of course, did nothing for the water below their bottom. Accordingly, preparations were made in 1937 to begin a surface deep-well pumping program.

Ledge elevations were available from early exploration drilling. Additional data on the overburden were obtained from churn-drilled test holes. Up to the present 31 test holes have been drilled, furnishing data necessary for the location of ten deep wells.

The first five wells were drilled by a large churn drill; the rest were drilled by a hydraulic rotary machine. The latter wells have progressed more rapidly because the heavy clay medium used in the hole has held the walls up better. The wells are of the gravel-wall type, with a vertical turbine pump installation. Water pumped from them is flumed out of the seepage zone.

Each new test hole and well has given helpful data for the next drilling. By 1940, sufficient information had been recorded to permit the construction of the ledge-contour map. This was an important step in the control program, as it gave at least a theoretical basis for spotting new wells and test holes.

In the fall of 1943 I hit on the idea that the contour of the water table should have more significance than the contour of the ledge in laying out new wells. This is true because the configuration of the water table depends more on the active deep-well pumps than on the configuration of the ledge. Proceeding from this premise, a number of water-table contour maps were made, using the elevation of water in the test holes as the water-table elevation. Two of these are reproduced (p. 74). They

[1] *"How to Approach the Mine Drainage Problem," E. & M. J., June, 1944.*

show the water table in the months of October 1941 and 1943. October was selected because that is a month when the water table would least be affected by climatic conditions. The maps show in a striking manner the results of the deep-well pumping program. They also show how much is yet to be done.

Results of the subsidence are also evident, especially in the map for October, 1943. The major low area near the center of the figure results not only from successful surface pumping but also because surface cracks south of the caves are admitting the water underground at an increasing rate.

The water-table maps do not impair the usefulness of the ledge contour maps. Coordinating the information on both maps produces the most reliable guide to date for spotting new test holes and wells. One must remember, however, that a favorable overburden is still essential, so that at each proposed location, as selected from the maps, a test hole must be drilled. A detailed study of the available test-hole logs has shown no apparent connection among the various aquifers. The water-bearing gravel beds apparently consist of lenses, the occurrence of which would be extremely difficult to predict without drilling.

Control of the indirect surface waters at the Morris mine will continue to progress in accordance with the methods described. More and more deep wells will be needed to drain the area effectively.

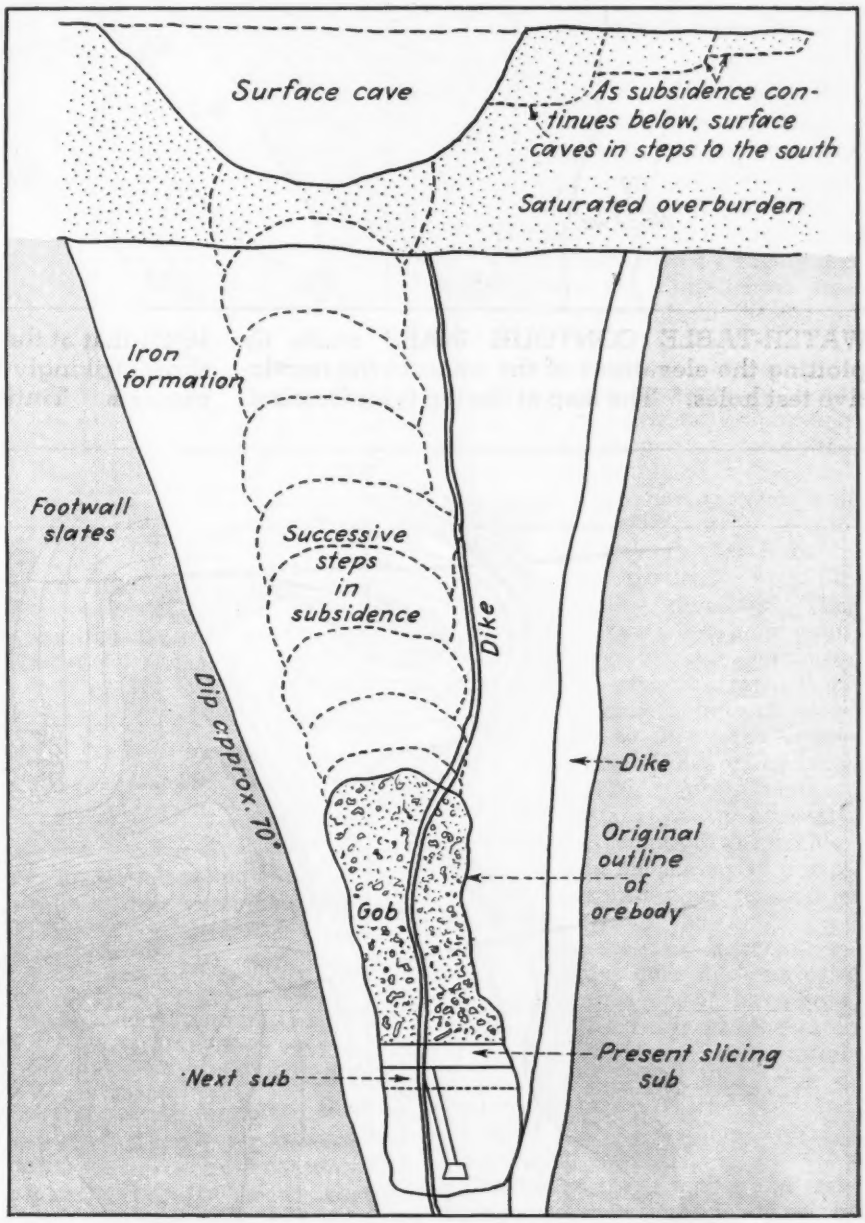
Control of Underground Waters.

1. ***Drifting and Mining.*** Water encountered in drifting at the Morris is negligible, as it is usually only in small quantities and drains off readily. To keep the water out of the ore is the main underground problem. The nature of the ore is such that water mixes readily with it, forming a heavy mud. The additional cost of handling this muddy ore in the contracts, in the cars, in the skips, and on the stockpiles has necessitated adoption of all possible schemes of underground control and has given greater impetus to the surface control program.

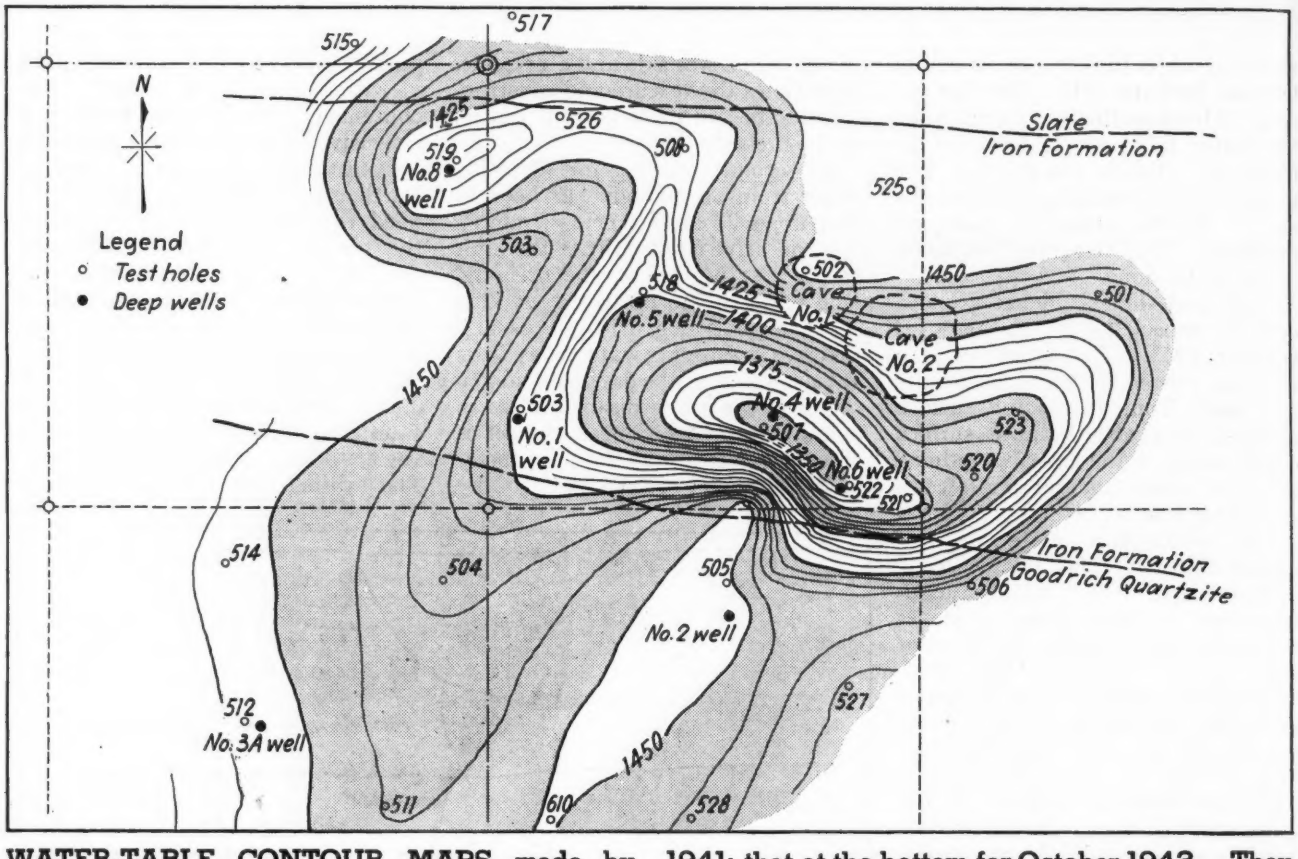
To devise a method to keep the ore dry is an individual problem for each working place. As mining progresses, steps are taken to eliminate water as the opportunities present themselves. In some contracts it has been possible to lay out the sequence of mining so that at least a portion of the mining place can be worked dry. Dikes passing through orebodies frequently divide working places into a wet side and a dry side. Sometimes the texture and construction of the ore itself keep a portion of the orebody dry.

A second scheme for draining water from an orebody has been to drop down 20 or 30 ft. below a mining sub and drive a dog drift to the limit of the wet portion of the orebody. Dog raises driven up to the working sub from this dog drift are usually effective in draining water away from at least a part of the ore being mined.

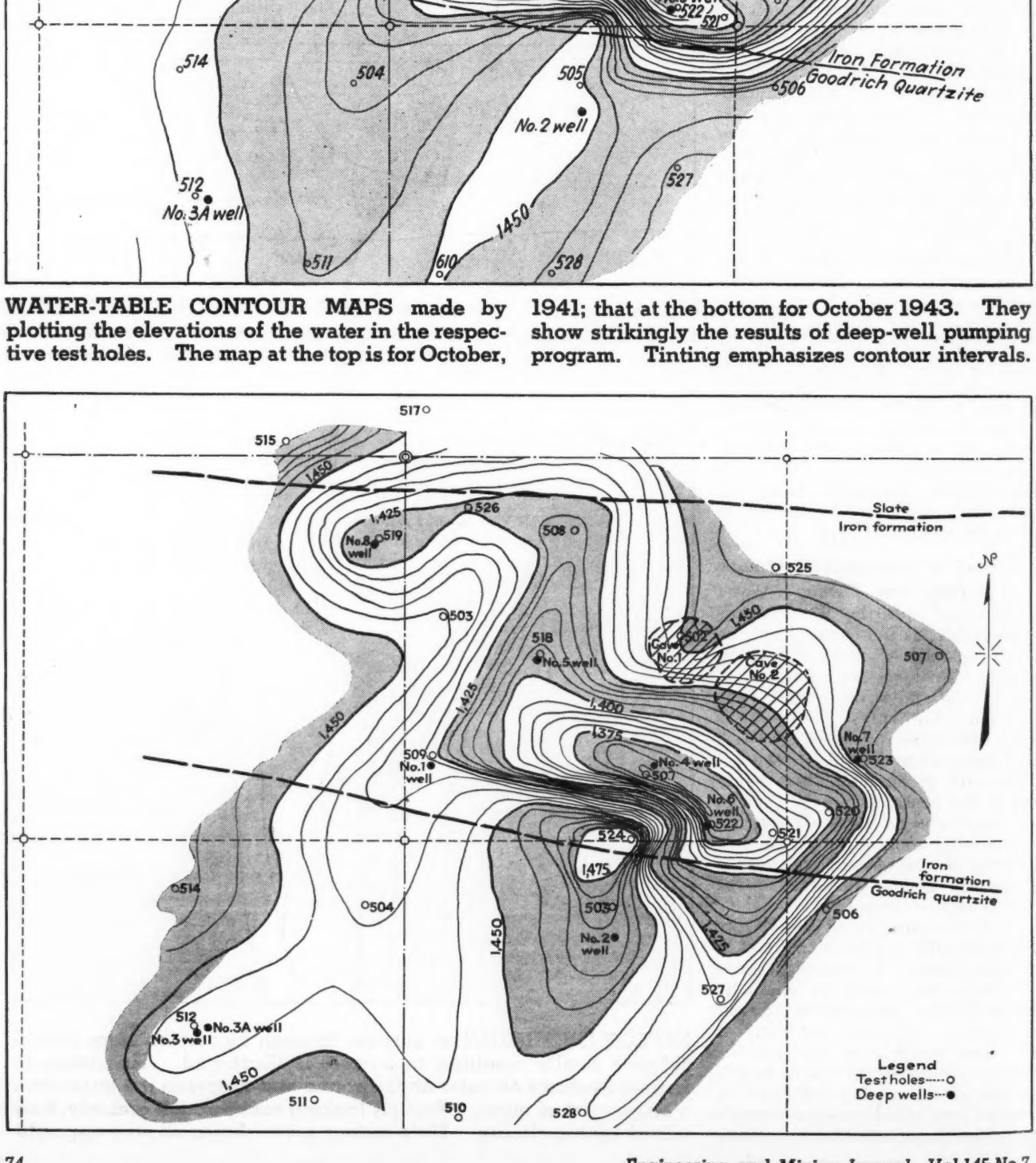
One of the major disadvantages in mining wet ore has been that it is necessary to scrape all this ore directly into cars. Wet ore stored in a raise packs very hard and water running in with it presents a hazard to the chutemen. On the other hand, it is expensive to keep a motor and crew waiting under the wet contracts. Furthermore, the cars cannot be filled to their rated capacity when the ore is wet. Because of these difficulties, a modification of the scraper-loading-drift system used at Oglebay-Norton's Montreal mine has been adopted at the Morris mine. In this system, the ore is scraped wet into a raise leading to a loading drift situated just above and at a right angle to the main haulage drift. The loading drift acts as a storage



EFFECT OF MINING on surface, through successive steps in subsidence finally resulting in a cave, is illustrated. This tends to increase volume of water underground and to spread the water over a larger part of mine. Section looking east through orebody, here mined by top-slicing. Note surface caves shown on map opposite



WATER-TABLE CONTOUR MAPS made by plotting the elevations of the water in the respective test holes. The map at the top is for October, 1941; that at the bottom for October 1943. They show strikingly the results of deep-well pumping program. Tinting emphasizes contour intervals.



space for the wet ore and permits some of the water to drain off. When the motor crew arrives, one of the chutemen operates a scraper on one side of the drift to pull the ore into cars. Thus, no time is lost by either the miners or the motormen. Several mining places may be served by one loading drift.

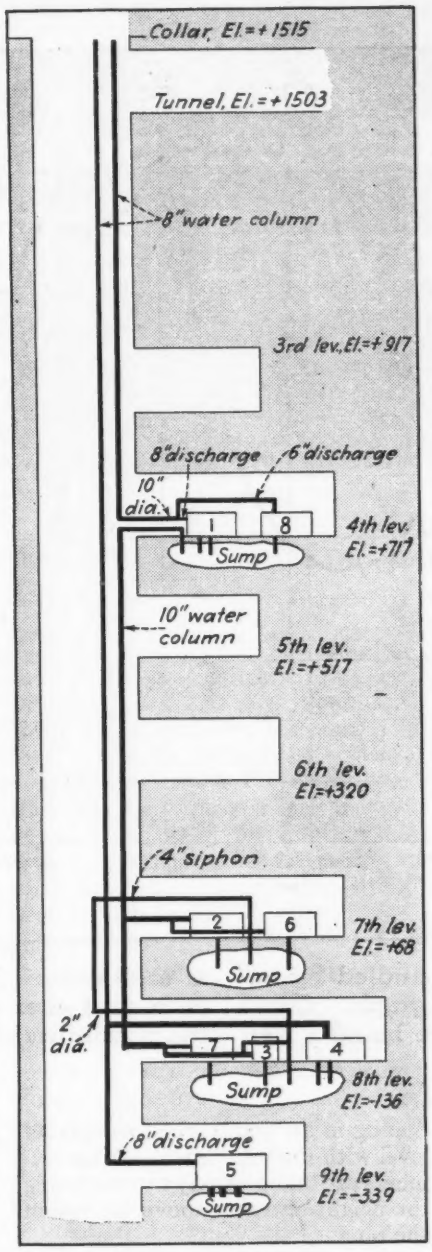
Wet open stopes are rare for the simple reason that wet orebodies in the Morris mine cannot be successfully mined by open-stoping—another bad effect of the water problem.

2. ***Underground Pumping.*** The Morris mine pumps approximately 850 g.p.m. to surface and has pumped as much as 1,200 g.p.m. The pumping system which takes care of this water is shown in vertical elevation. The predominant features of the system are its elasticity and its auxiliary provisions for emergencies. A study of the drawing shows that for every main pump there is a standby pump or siphon for use if the principal installation breaks down. Not shown in the figure is a small auxiliary centrifugal pump on the 9th level which can transfer water to the 8th level if that becomes necessary.

In the event of power failure, the safety of the mine depends on the sump storage capacity and the efficacy of the underground dams. The storage capacity of the sumps will permit all the pumps to be at a standstill for about three hours. After that, temporary dams must be installed. The storage capacity of the sumps is ordinarily more than three hours, but so much ore is deposited in the sumps from the water that the capacity is greatly reduced.

Both permanent and temporary dams are in service at the Morris mine. Of greater importance are the permanent dams separating the Morris workings from the Barnes-Hecker workings to the west. The Barnes-Hecker mine was the scene of a disastrous inundation in 1926. At that time, natural damming kept the waters out of the Morris long enough to allow a permanent dam to be built. All possible avenues for the water were bulkheaded with stoppers of concrete up to 30 ft. in thickness.

Each level has a temporary-type dam a short distance from the shaft. These are of timber with the exception of a steel water door on the 9th level. In the timber dam, the timbers are kept piled up systematically on the side of the drift. If a dangerous flow of water occurs, the timbers are placed in a permanent concrete frame by an experienced crew in ten minutes. The dam is kept in place



PUMPS

1. Prescott, 6½x36-in., 1,000-g.p.m., 1,000 ft. head, double-acting duplex. 2. Aldrich, 7½x16-in., 500-g.p.m., 550-ft. head, single-acting vertical triplex. 3. Aldrich, 6x12-in., 300-g.p.m., 1,200-ft., head, single-acting vertical triplex. 4. Prescott, 7x24-in., 800-g.p.m., 1,650-ft. head, double-acting duplex. 5. Prescott, 6½x24-in., 1,000-g.p.m., 2,075-ft. head, double-acting triplex. 6. Allis-Chalmers, size 4, 1,760-r.p.m., 500-g.p.m., 750-ft. head, 6-stage centrifugal. 7. Goulds, size 4, 3,550-r.p.m., 500-g.p.m., 900-ft. head, 2-stage centrifugal. 8. Goulds, size 6, 3,550-r.p.m., 1,000-g.p.m., 1,000-ft. head, 4-stage centrifugal.

PUMPING SYSTEM underground in Morris mine, in vertical elevation. This handles normally about 850 g.p.m.

until the pumps have lowered the water behind it completely. That water is controlled by valves and pipes going through the permanent concrete frame.

The steel water-door dam consists of a heavy steel door set in a concrete frame keyed in the drift. Should an emergency develop, the door can be closed in about two minutes.

Recording and Interpreting Results

Surface. No system of control is adequate unless a careful record is kept of its progress. On the Morris mine surface, records are kept of the deep-well pumping and of the elevation of water in the test holes.

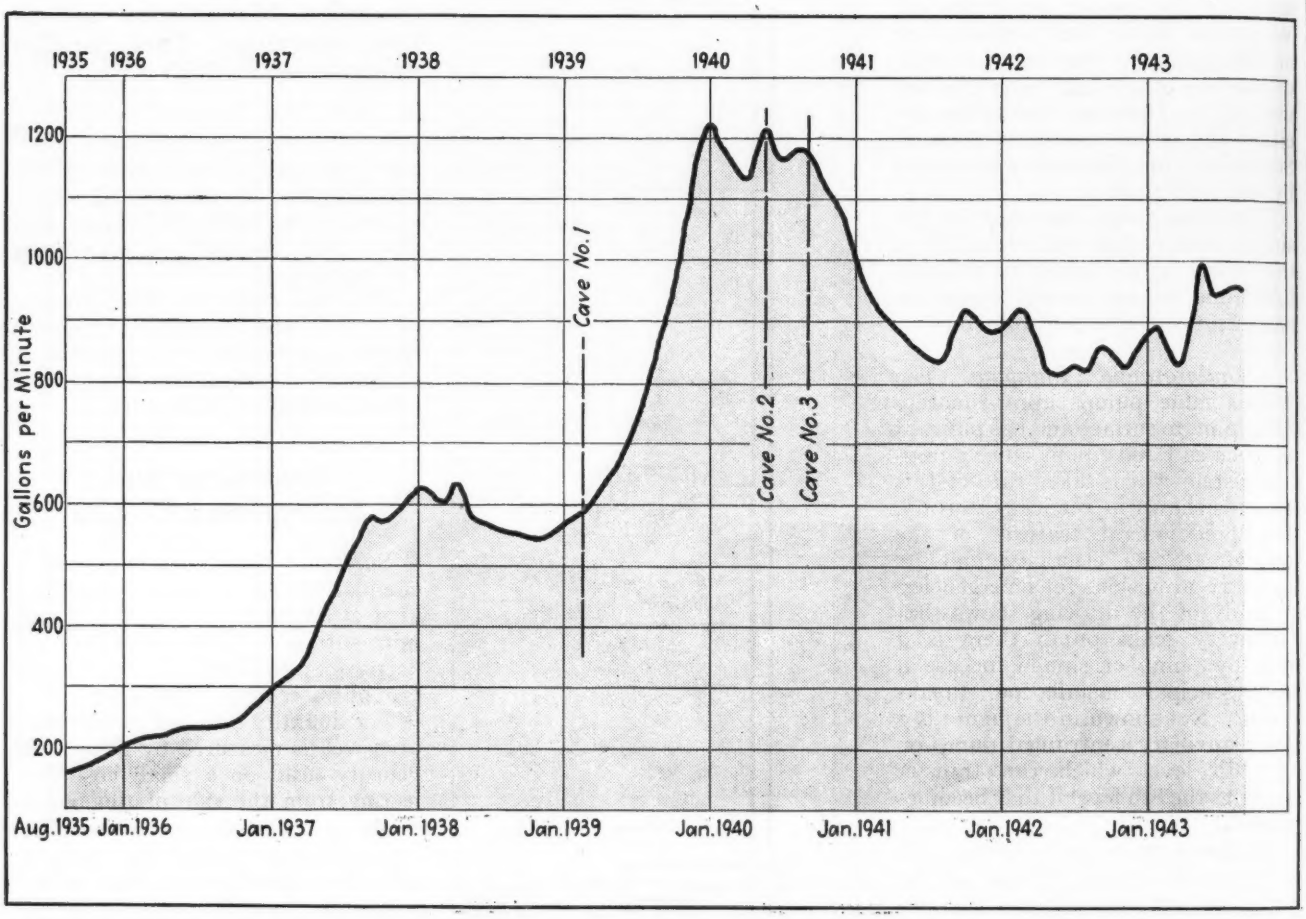
The quantity of water issuing from each well is measured by gaging the velocity head on a small hose projecting from the side of the pump-discharge pipe. From this reading, the gallons-per-minute are computed. These readings are taken once a week and recorded on graphs and charts which show at a glance the trend of the pumping. The total amount of water pumped from surface is about 2,500 g.p.m.

As the quantity of water available decreases at a particular well, the rate of pumping decreases. This drop in rate continues to a point where "surging" begins. Surging is that condition where the capacity of the pump exceeds the flow of water to the pump, so that large "swallows" of water are followed by large "swallows" of air. Adjustments on the pump installation are necessary to remedy this condition, which otherwise results in inefficiency of pumping and inaccurate measurements of quantity.

Test holes are also measured regularly. This is done by lowering a small bell-shaped pipe at the end of a tape. When the surface of the water is reached, a sharp reverberating sound is heard. At this point a reading is taken on the tape and recorded. These readings are also charted and graphed.

Results of the pumping and test-hole measurements are finally shown on the water-table contour map.

As an aid in interpreting results and planning for the future, experiments have been made by tracing the flow of water with dyes. Uranin dye was poured down a test hole in the



TOTAL AMOUNT OF WATER handled by underground system is shown by this graph. Curve shows total of weir readings, there being a weir at each sump. The caves indicated occurred in each case after a rise in water flow, suggesting the possibility of a relationship between the two.

subsiding area and samples were then taken over an extensive underground area. Results of the experiment were uncertain, most likely because of excessive dilution of the dye.

Some improvement in the quantity of underground water has been noted since the surface pumping began, but how much of the improvement is due to the deep-well pumping is difficult to ascertain. The continual subsidence produces an ever-changing condition. At some stages subsidence tends to open new surface crevices; at other stages it tends to seal up old ones. Because surface pumping continues at a steady rate, the underground results cannot help but be erratic. Time alone will show the true effect of h deep wells.

Underground. Operating time of the underground pumps is recorded so that the total amount of water pumped from the mine for any period may be easily calculated. In addition, there is a weir at the entrance to each sump. The weirs are the standard triangular 90 deg. type. A plug in an undisturbed zone is set level with the weir notch. Measurements are taken weekly by measuring the height of water above the top of the plug.

Weir recordings are charted and graphed. A graph of the weir readings is reproduced. The curve shows only the total of all the weir readings. This curve is correlated with all the other data on water control.

On the graph of the weir readings is shown also the time of occurrence of each surface cave. A relationship which is noted is that each cave has occurred a short time after a rise in the water flow. This relationship is not yet definite, but it does have a logical basis. The surface cave is only a final step in a subsiding action which has been progressing for some time. This preliminary subsiding action apparently opens up some cracks which admit the higher flow of water previous to the occurrence of the cave on surface. When the final cave-in occurs there is a momentary surge of water followed by a drop as some of the crevices are gradually filled in. If this hypothesis is borne out, it may be possible in the future to predict roughly the occurrence of a cave.

Conclusions

As previously stated, the Morris mine water-control program is somewhat unprecedented in mining history. Diversion ditches are being planned to keep direct surface waters off the mining area. A deep-well pumping program is designed to drain eventually all the indirect surface waters over the mining area. As this deep-well program works toward that goal, it is expected that underground waters will gradually diminish. Meanwhile, temporary measures are being taken underground to alleviate somewhat the results of the wet conditions. Careful records of surface and underground pumping are regularly correlated to determine the progress of the program.

The eventual results of the water-control system, even though negative in some respects, should prove to be a marked accomplishment in the handling of mine waters.

Why Alaska Juneau Shut Down

Wage increase awarded by WLB was only one of several factors

THE UNIQUE POSITION established by the Alaska Juneau Gold Mining Co. as the producer of the leanest gold ore exploited in an underground operation was achieved through a combination of good engineering and prudent management. After an initial period of uncertainty as to the financial outcome, the late F. W. Bradley brought the property to a dividend-paying basis, and operated it for years, achieving wide recognition in the mining world for his skillful handling. In this he was ably assisted by his brother, P. R. Bradley, who succeeded him and is now chairman of the company. The reasons for closing down the property are of interest to the entire mining industry. Here we summarize the more important facts.

At the outbreak of the present World War, it was evident that certain industries would suffer a loss of manpower through inability to compete with war industries in paying higher wages. Gold mining was naturally one of the first to suffer thereby, because of the fixed price of its product, and Alaskan mines were additionally affected by the need for diverting men and equipment to meet the threat of invasion by Japan.

Force Shrinks

The crew of 1,000 men normally employed at Alaska Juneau shrank rapidly to 250 men. Inasmuch as the low grade of the Juneau ore requires large-scale operation if costs are to be held down, it was recognized that mining would be unprofitable with the small crew, but it was decided to continue as long as the loss was less than the standby expense of a complete shutdown. The aim was thereby to maintain the nucleus of a reliable crew until the war ended and labor conditions became more or less normal. The many unique features of Alaska Juneau operation made such retention of key men desirable. In general, the policy for the duration was to be one that would incur the least loss, and not one that would produce maximum earnings.

Decision Forced

Inasmuch as the actual survival of the enterprise was at stake, the company was compelled to do everything possible to avoid any such wage increase as that finally demanded. Accordingly, both it and the union, with which the company has had a contract, pursued the whole gamut of the laws and regulations controlling industrial relations, in an honest effort to find some solution that would satisfy both sides and win approval of the War Labor Board and other bodies concerned. The Board ruled that if some sacrifice had to be made to keep the mine in operation, it should not be by labor. On the other hand, it was unable to give the company relief through the practice adopted in similar circumstances of providing an increase in the price of the company's product. Thus the sacrifice would be wholly on the company's part. All efforts to reach a middle position having failed, it became evident that the loss to the company would be too great to justify continued operation. Accordingly, the mine and mill have been closed.

In the course of this controversy every formula provided for handling such disputes has been used. The War Labor Board has definitely supported the demand for increased pay. Moreover, while the company contends that never at any time was the matter of retroactive pay up for adjudication before the War Labor Board, the regional board in Seattle decided that it was and has ruled in favor of the employees. This point has yet to be concluded, presumably by some court action.

The question of retroactive pay has arisen because in normal times the contract between the company and the union was renewed each year as of May 1, and was to be in force for the ensuing year. However, when the demand for an increase was made just prior to May 1, 1943, conditions had become so abnormal that it was impossible for the company to negotiate on any basis of increased pay. Of necessity it was compelled to state emphatically at the outset that any increase would force immediate shutdown, and has never receded from that position.

Company Sacrifice

The Alaska Juneau company has therefore been at a decided disadvantage during the year over which this controversy has continued, in that it did not have definite knowledge at any time on which to base its decision regarding a complete shutdown. If the claim for retroactive pay is upheld, the company would thus be penalized for that year during which a decision was impossible.

Although the War Labor Board, as already stated, concluded that any settlement should involve no sacrifice by labor, it has had no regard whatever for the sacrifices the company has been forced to make through no fault of its own.

How a New Filter Design Raised Vanadium Output

ROBERT H. RAMSEY, *Associate Editor*

THIS IS THE STORY of an entirely new approach to the mechanical design of filtration apparatus, and of the filter that was built as a result. Developed originally as a solution to a troublesome problem in the sand-leaching plant of U. S. Vanadium Corp., Uravan, Colo., this new filter appears to have considerable application in the process industries, for it handles a range of particle sizes heretofore thought impossible to treat by vacuum filtration without prior classification.

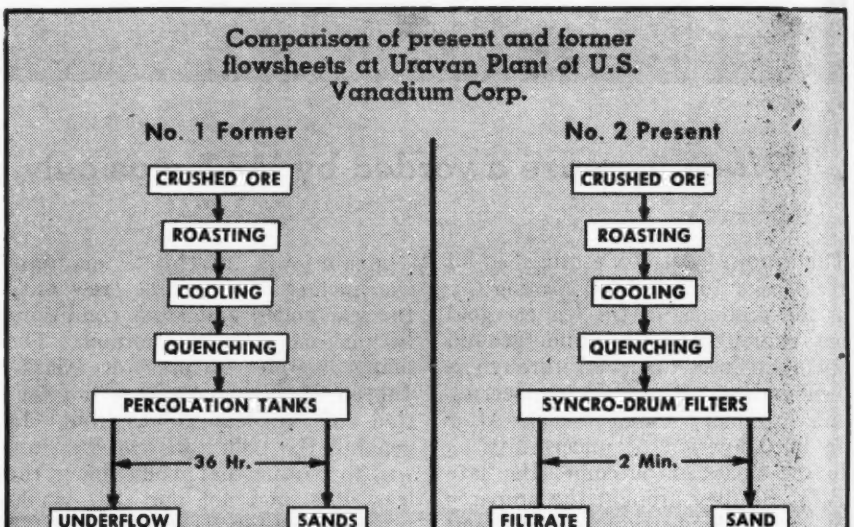
Nature of the Problem

The vanadium ore, in the treatment of which this filter was developed, consists predominantly of a sandstone containing about 2 percent vanadium, generally in the form of a vanadium-bearing mica and carnotite. That part of the vanadium recovery process with which the Peterson Syncro-Drum filter is connected is indicated in the accompanying flowsheets (Nos. 1 and 2), which outline the method before and after installation of the filter.

Briefly, the method consists of crushing the sandstone to minus-10 mesh in size, roasting it with sodium chloride, quenching the calcine in water to dissolve the sodium vanadate formed in the roast, then separating the liquor from the sand. The clarified liquor goes to a precipitation plant and the sand goes to an acid leaching plant for further treatment.

The trouble with the process, as it was originally, lay in the fact that if the liquor in which the calcine is quenched is allowed long contact with the calcine, the resultant cooling causes a portion of the dissolved vanadium salts to re-precipitate. A rapid separation, including adequate washing, of the sand and the liquor is therefore desirable, yet no sort of vacuum filtration, the more obvious method, had been successful in accomplishing it.

Orthodox vacuum filtration could not be applied to this leached vanadium sand because of three factors:



DOUBLE-DRUM CONSTRUCTION and an overhead-feed reservoir make this Peterson Syncro-Drum filter unique in its field. Designed in cooperation with the staff of U. S. Vanadium Corp., the new unit simplified a leaching operation and increased production at the company's Uravan plant.

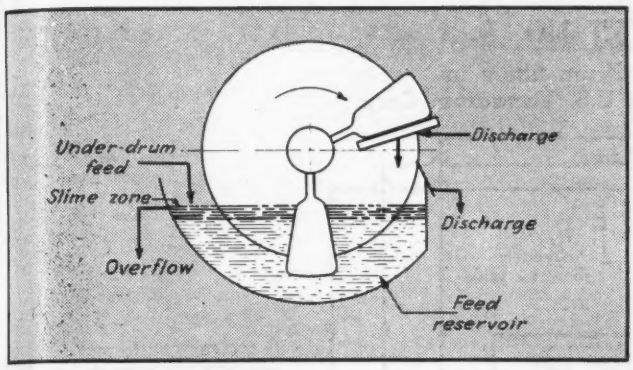


Fig. 1 . . . Showing why the slime zone, present in reservoirs containing the vanadium ore pulp, tended to blind media of disk and drum filters.

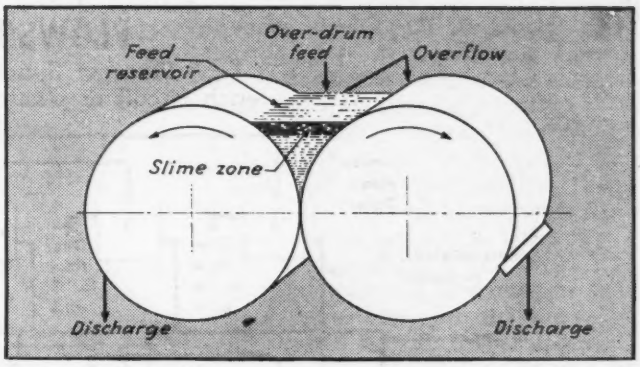


Fig. 2 . . . Elements of Syncro-Drum filter, showing how filter medium encounters sand before slime, thereby escaping the blinding effect.

first, the wide range in particle size of the sand, which is minus-10 mesh to 7 percent minus-200 mesh; second, the rapid settling rate of the coarse fractions; third, the existence of sufficient slow-settling slime to form a definite slime zone in any reservoir containing the sand. It is unnecessary to grind the sand finer to get a satisfactory recovery of vanadium in leaching it, and it would be too costly to grind the sand fine merely to favor subsequent filtration equipment.

In a drum-type filter, for example, no amount of agitation in the reservoir could maintain a homogeneous pulp therein, and the filter medium entering the reservoir had, therefore, to pass through a slime zone. Even with back pressure of air at this point, the resultant coating of this slime was enough to inhibit proper cake formation of the coarser particles. Disk filters and internally fed drum filters were subject to the same difficulty. Fig. 1 illustrates this point.

A top-feed single-drum filter was also tried, and here the size segregation of the feed was less important. A new difficulty entered, however, in that, lacking a feed reservoir, the density of the feed to the top of the drum had to be such that the mother liquor displaced in forming a cake, plus the moisture remaining in the cake, must equal the percent of liquid in the feed. If an increasingly dilute pulp were fed, for example, the mixture may overflow, contaminating the cake already filtered. Increasing the rate of filtration, to allow a margin of safety, by using media of greater porosity, resulted in a filtrate containing 4 or 5 percent solids, which made subsequent clarification a major problem. In addition, adjusting the rate of feed to the gradually decreasing filter rate, as medium pores became blinded, was difficult.

Lacking a better solution to the problem, the company's practice had been to use a system of sand-leaching percolation tanks, from which the sands were eventually sluiced, after a 36-hr. treatment, to a tailing pile for drainage. The sand in this pile then had to be reclaimed by a dragline and trucks for shipment to the acid leaching plant.

Solution of the Problem

In conjunction with the U. S. Vanadium engineers, the problem was tackled by Peterson Filters & Engineering Co., of Salt Lake City, with the idea of developing a filter in which the filter medium would strike the coarse sand before it met the slime zone, but in which close regulation of feed rate and density was not required. To skip over a long period of experimentation in one sentence, the result was the Peterson Syncro-Drum filter.

Fig. 2 shows the elements of the Syncro-Drum filter. The reservoir is set above the two drums, but a control overflow back into the preceding circuit accommodates any surges in feed and automatically compensates for increasing resistance in the filter medium. The medium enters the slime zone last, and the cake of coarser particles that forms on the medium first tends to keep the slime away from the cloth. The result is a much more permeable cake than would be obtained if slime were next to the medium and sand were above it. The filtration is so rapid that the cake can be washed by three sprays before it is discharged with a moisture content of 17 percent. A simple belt conveyor delivers the sand to the acid leaching plant.

This last fact is of importance in that the conveyor thus eliminates the former operations of sluicing, draining, and reclaiming the sand. Other economies and an increase of production have resulted from use of the new filter.

How the Filter Is Used

Flowsheet No. 3 shows the place of the Syncro-Drum filter in the present circuit. Two such filters are used, and either will sustain the entire load while the other is down 4 or 5 hours for a cloth change. Note how surge tanks are placed to relieve operational fluctuations, and how steady-head tanks aid in controlling recirculated liquor so as to maintain uniform strength of liquor to precipitation and a uniformly low soluble loss in the sand.

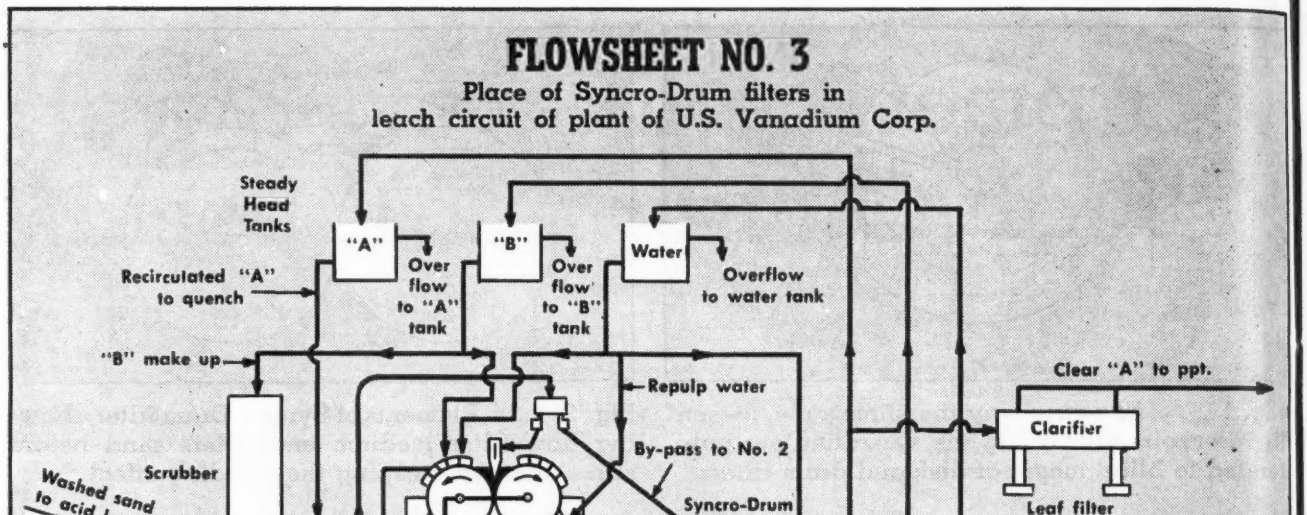
Hot calcine from the roaster cools somewhat in the drag cooler, but even after the sand is quenched in "B" liquor from the scrubber and recirculated "A" liquor, the resultant slurry is still at 75 to 80 deg. C. Hot water is added here to make up evaporation losses in quenching.

Note that the overflow from the Syncro-Drum reservoir is used as a transporting medium to aid in bringing up fresh sand from the quench box. The density of the slurry pumped is thus reduced to 25 percent solids. It has been found that no troublesome circulating load of slime is thus built up by this maneuver. Although a certain amount does accumulate, it has never required a shutdown or bleed-off to eliminate it.

Hot water is used in the sprays as a control medium, and strength of the "A" liquor can be held constant quite easily by varying the proportions of "B" liquor and hot water used in the wash. Various statistics of the filtering operation are given in Table I.

Mechanical Details

Though embodying the basic fundamentals of a single-drum vacuum



filter, the Syncro-Drum arrangement presented some unique design problems. Accuracy in construction was demanded to a greater degree than in single-drum filters. Synchronization of the two drums is obtained through opposite-hand worm wheel drives from a common worm shaft.

Maintenance of the over-drum reservoir requires a seal at the ends of the drums and at the point of tangency of the drums. The end seal is obtained by using cheek plates that bear against shoes built into the drum heads. Cheek-plate pressure is adjustable and is set by noting the reading of an ammeter connected to indicate the load on the filter drive motor. An absolute seal is not desired because a slight leakage acts as a lubricant for the Micarta cheek plates.

The tangential seal at the drums' center is obtained by providing a back pressure at that point in each drum, so that the filter cloths are forced together. Leakage from center or ends is returned through drip pans to the quench box.

A special scraper has been designed for this job. It involves a double-fulcrum adjustment rather than the common single-fulcrum scraper. The scraper is set at "3:30 on the clock." No difference has been

Table I.—Operating Statistics for Syncro-Drum Filters

AT PLANT OF U. S.
Vanadium Corp., Uravan, Colo.

FILTER DATA

Filter area.	144 sq.ft. (*a*)
Drum speed	2 m.p.h.
Vacuum	12 in. Hg
Temperature of feed	70 to 80 deg. C.
Temperature of filtrate	50 to 60 deg. C.

(*a*) Four drums, 3×4-ft.

COMPARISON WITH FORMER METHOD

	Former	With Filter
Washing efficiency, percent	97	93
Loss of vanadium in feed, percent	0.030	0.015
Handling losses	Definite	None
Labor, man-hr. per ton-day	1.0	0.3
Power required, hp	56.5	73.5

POWER DISTRIBUTION

With filter:	Hp.	Former method:	
Filters, 2 at 3 hp	6	Sand pump,	3
Hydroseal "A" pump	3	Liquor pumps, 3 at 2 hp.	6
Filtrate, "A"	2	Sluicing pump	7.5
Wilfley repulp pump	3	Sand tailing pump	15
Filtrate "B"	2	Dragline, estimated	25
Surge tank pumps, 3 at 2 hp.	6		
Vacuum pumps, 2 at 25 hp.	50		56.5
Blower	1.5		
	73.5		

Table II.—Probable Applications for Syncro-Drum Filters in Process Industries

BASED ON LABORATORY INVESTIGATIONS ALREADY UNDERTAKEN. LIST IS BY MATERIALS TREATED

Phosphate rock	Fertilizers
Trisodium phosphate	Spodumene
Alumina	Feldspar
Calcium lactate	Mica
Potash from sylvinite	Basic magnesium carbonate
Ammonium sulphate	Cement rock
Reclaimed rubber	

found in cake value between this scraper setting and a 6:00 o'clock setting.

The valve arrangement is totally inclosed, and provides a means of collecting filtrate without use of many flexible connections. A counter-thrust in the valve automatically compensates for the pressure that tends to disturb the seal at the wearing surface. Over a long period, this balancing effect leads to a lower maintenance cost than has heretofore been possible with this troublesome feature on rotary vacuum filters.

To summarize, it can be said that the design has called for accurate manufacturing techniques throughout, and the resultant machine is smooth in operation and rugged. Laboratory investigation indicates that, from a capacity standpoint, the Syncro-Drum will be a relatively small filter. A maximum filter area of 108 sq. ft. in drums 3 ft. in diameter with a 6-ft. face is regarded as being the optimum maximum size.

Other Applications

Study of the Syncro-Drum filter indicates that it possesses certain features other than the obvious mechanical ones, that enable it to fill a definite gap in the capabilities of filtration equipment thus far available. In the matter of size of feed, the Syncro-Drum can take particles of up to 0.4-in., above which the drainage-type filters operate, down to all minus-48 mesh, below which the drum and disk filters are used. The vanadium sand feed, for example, contains both 10-mesh and minus-200-mesh material.

The Syncro-Drum also handles a wide range of pulp densities running from about 20 up to 70 percent solids. All the way, in short, from thickener feed up nearly to material suitable for a dryer. This range is made possible by the over-drum feeding, the reservoir, and the overflow return.

It should also be noted that the filter is the first machine to handle successfully material in the size range of minus 0.4-in. to plus 48 mesh at a vacuum of 5 to 24 in. Hg.

In considering further applications for the Syncro-Drum filter, therefore, it is evident that it will find its greatest usefulness in those processes involving the handling of wide-range particle-size products. In ore treatment, these will be found where grinding to extremely fine sizes is not required to release the valuable mineral from itsthe gangue.

Dewatering wastes for disposal and concentrates for further treatment are uses that suggest themselves. These will become ever more common as separation processes of the heavy-media type come into more general use, inasmuch as such separations are usually made at a corase size. In coal-preparation plants there are many applications for the Syncro-Drum in dewatering usable fines and disposing of wastes. Table II shows a list of specific applications of the Syncro-Drum filter in which laboratory tests have indicated the suitability of the equipment.

Conclusion

The development of this filter is a concrete example of what can be accomplished by the combined efforts of the designer and the operator. Its possibilities could have been fulfilled only by experimenting with the filter on a commercial scale, as was actually done.

Full-scale trials would have been impossible without the determined effort of the staff of the U. S. Vanadium Corp. Their fine cooperation and their vision, especially that of the engineering staff under Blair Burwell, then general superintendent and now vice president, are gratefully acknowledged by the Peterson company. C. Lynn Peterson, who did a great part of the development work on the filter, also wishes to acknowledge the assistance of C. J. Peterson in problems of design.

Big Postwar Demand for Potash Expected

POTASH PRODUCTION from mines in the United States may be maintained at high levels for some time after the war ends, because of the need of exporting food products to devastated countries, according to a Bureau of Mines' report. The present capacity of these mines, however, is more than enough to care for normal domestic requirements under peacetime conditions. The output of domestic potash has continued to rise, reaching 1,428,840 short tons of salts in 1943, equivalent to a K_2O content of 739,141 short tons.

Mine production of potash salts in the Carlsbad district, in New Mexico, the principal producing area, has mounted steadily. Last year the three companies operating there mined 3,433,243 short tons of sylvinite and crude langbeinite combined, which was almost 400,000 tons more than in 1942. The average equivalent K_2O content of the mined salts decreased from 21.52 percent in 1942 to 21.19 percent in 1943. The average equivalent K_2O content of the sylvinite mined was 23.9 percent in 1940; 22.9 in 1941; 22.7 in 1942; and 22.6 in 1943. Sylvinite is a mixture of potassium chloride (sylvite) and sodium chloride (halite). Langbeinite is a potassium-magnesium sulphate.

The alunite deposits in the Marysvale district, Utah, long thought of as a possible source of potash, received considerable attention. Their future development, however, might be influenced by a more favorable aluminum situation and a large supply of potassium sulphate from other sources. Exploratory work has been done on them by the Bureau, and several thousand tons was mined by Kalunite, Inc., and stockpiled at its plant in Salt Lake City to await treatment by the company's sulphuric acid process.

Zinc Producer from Gold Prospect

U. S. Smelting's Bayard property in New Mexico is contributing to metal output

JOHN B. HUTTL. *Associate Editor*

WHEN THE BAYARD property of the United States Smelting, Refining & Mining Company, locally known as the Bullfrog mine, entered the ranks of active zinc producers early last year, it was an event in the history of the Bayard-Central-Hanover-Vanadium mining district of Grant County, N. M. This area has been the scene of intense activity, and the results attained have been gratifying. Several other mines also have been brought into production, with a desirable increase in the output of zinc.

At the outset, prospecting for zinc at the Bullfrog, which then was a small gold property near Bayard, was purely speculative. An old inclined shaft was fitted with a new headframe, rehabilitated, and sunk from 170 ft. to 400 ft. Levels were established at 250 and 400 ft. and considerable drifting and some exploratory drilling were done, though with results that were dubious for some time. Early in 1942, however, commercial ore was opened, and further development was encouraging enough to warrant a new, vertical shaft. Crosscuts on the 250 and 400 levels were driven to the site selected, and work on the new shaft was begun at three points, by sinking from surface, and by raising and sinking from the 250 and 400 levels.

The section above the 400 level was driven by advancing upward and downward along a pilot hole, which was enlarged to full cross-section after connection had been made at different points. Below the 400 level, however, the opening was carried full size.

The shaft has three 4½x5-ft. compartments, and is equipped with a 61-ft. steel headframe, cages to take 20-cu.ft. mine cars, and a 125-hp. Sullivan double-drum hoist. Levels have been established at 250, 400, 550, 670, and 700 ft., the latter being the sump level.

The geology of the area is somewhat complex. Ore under exploitation occurs in a system of fissure veins and faults in a large diorite sill which is up to 1,000 ft. thick, in the Colorado formation. The valuable minerals are principally sphalerite, with small quantities of lead and copper. Gangue usually consists of diorite with a little pyrite.

HEADFRAME AND MILL at U. S. Smelting Co.'s Bullfrog mine, in New Mexico. To the right of the 61-ft. steel structure are the primary and secondary crushing plant and the flotation center.

Though hard, the ore breaks up readily. Diamond drilling plays an important role in underground exploration and development, as well as in prospecting virgin parts of the property from the surface. Underground, it is done on the levels and in raises and stopes to guide development and mining. In the stopes a Sullivan 6 machine is operated by the company. On the levels and on surface the drilling is done by contractors.

Breaking Ground

Blast-hole drilling is done mostly with I-R, G-D, and C-P drifters using 1-in. hollow-round steel with forged-on bits, and in the raises and stopes with I-R and Sullivan self-rotating stopers with 1-in. hollow, octagonal steel. Only in isolated workings are detachable bits used. Ore and waste are trammed on the upper levels in 20-cu.ft. cars by hand, and on the lower levels by Mancha battery locomotives. Loading is mechanical, being done with Eimco, G-D, and Sullivan loaders.

Mining, in general, is done by shrinkage stoping, though in some sections cut-and-fill is used. The raises are spaced at irregular intervals, from 100 to 150 ft., depending on the total length of the stoping area. Draw chutes 3½ ft. between the sides are spaced at 10-ft. centers. Heavy timbering is required on the sills under the stoping areas. Normally, 10x10-in. timbers provide adequate support.

Ventilation is natural. In long headings additional air is furnished by portable Coppus fans blowing through canvas tubing. Compressed air required is provided by two I-R Imperial Type-10 compressors driven by 150- and 200-hp. motors. Water is handled by I-R motor pumps. Three of these units driven by 50-hp. motors are installed on the 400 level, at the main pump station; two are on the 550 level; and two on the 670 level, these being driven by a 30-hp. motor. Ore hoisted is delivered to a dumping platform above the coarse-ore bins at the primary crushing plant.

The concentrator consists of three

buildings housing the primary crushing plant, the secondary crushing plant, and the mill proper. All are interconnected by belt conveyors. Facilities are available also for storing ores from the Slate and Shingle Canyon properties, operated by the company in the district, in addition to the Bullfrog ore. The automatic sampling plant shown in the flowsheet will permit accepting custom ores if this be desired.

A New Flowsheet

Originally the mill was laid out to produce a leady zinc concentrate, but recently the flowsheet was changed, and currently a lead concentrate and a zinc concentrate are being produced. Flotation follows standard practice, with grinding to 50 percent minus-200 mesh and the pulp overflowing the classifier at 30 to 35 percent solids. The pH on the zinc circuit is 8.5. Ratio of concentration is 4:1. Treatment methods are explained in the accompanying flowsheet.

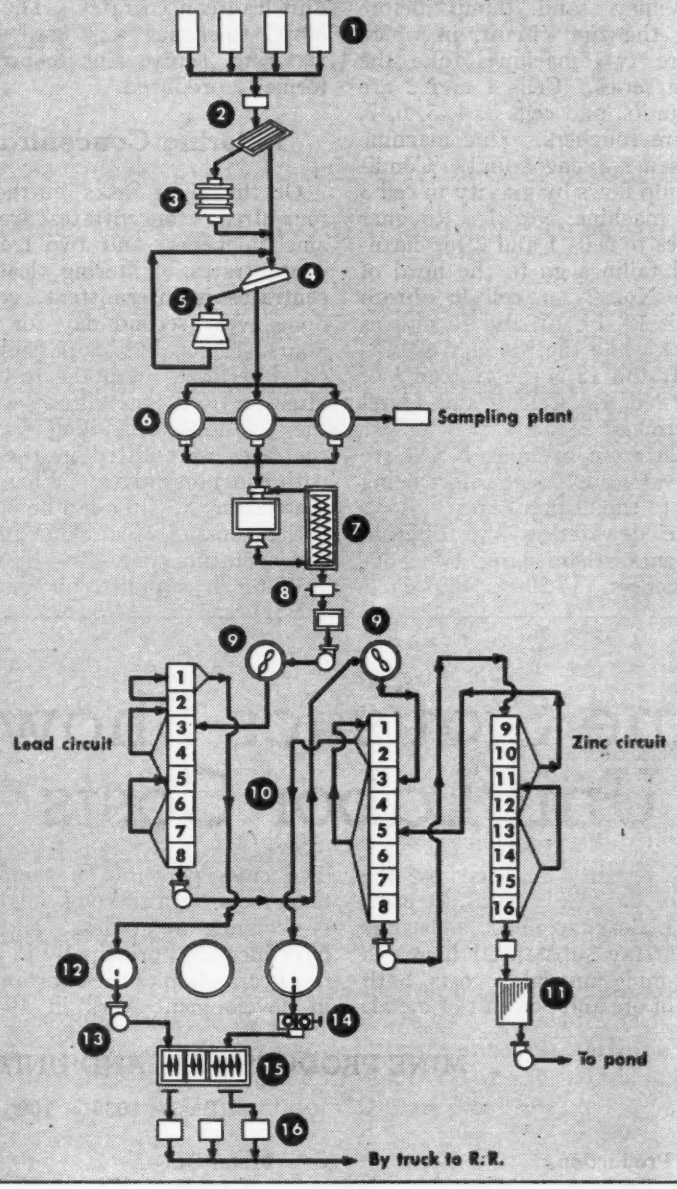
Storage facilities at the primary crushing plant comprise four bins having a total capacity of 310 tons. Ore is drawn off with a vibrating feeder on a traveling carriage below the bins which delivers to a conveyor system leading to a grizzly. The plus $1\frac{3}{4}$-in. oversize is reduced to $1\frac{3}{4}$ in. in the primary gyratory, which, with the secondary cone crusher, is in closed circuit with a screen. The grizzly undersize goes direct to the screen. Screen undersize constitutes the final ball-mill feed and is conveyed to fine-ore storage, being weighed en route. Bin layout and ore withdrawal facilities permit segregation and blending of stored materials.

Grinding to 50 percent minus-200 mesh is done in a ball mill in closed circuit with a classifier. Ball charge consists of 3- and $2\frac{1}{2}$-in. balls in equal proportions.

Flotation follows, reagents being added to the circuit at the ball-mill feed end. They include Aerofloat 31, $ZnSO_4$, and NaCN.

From the sump to which the classifier discharges the pulp is pumped by a 3-in. Wilfley sand pump to a conditioner at the head of the lead circuit. Cell 1 functions as a recleaner, cell 2 as cleaner, cells 3, 4, and 5 as roughers, and cells 6, 7, and 8 as scavengers. Conditioned pulp is introduced at cell 3. The scavenger product is returned to cell 5, the rougher froth to cell 2, and the cleaner concentrates to cell 1, producing the final lead concentrate.

FLOTATION PLANT FLOWSHEET BULLFROG MINE, BAYARD, N. M.



LEGEND

1. Four coarse-ore bins, two 125-ton, one 100-ton, one 85-ton
2. Magnetic pulley ahead of steel grizzly with 1¾-in. spacing
3. Primary crusher, 3-ft. Traylor TY gyratory
4. Rod-deck screen, 4x8-ft., ⅜-in. openings
5. Symons cone crusher, 3½ ft.
6. Three circular hopper-bottomed fine-ore bins with overhead shuttle conveyor. Each bin 150 tons, steel
7. No. 76 Marcy ball mill in closed circuit with 60-in. Wemco screw classifier, discharging over chip screen to concrete sump (8).
9. 10x10-ft. conditioner
10. Three Denver Sub-A flotation machines, 24-in., 8-cell. One in lead circuit, two in zinc circuit
11. Pilot table for final tailings
12. Thickeners, 20-ft. for lead (left), 30-ft. for zinc (right), 30 ft. (center)
13. Wilfley pump, 2 in.
14. Wemco duplex Hilift pump
15. Eimco filter, 6-ft.
16. Loading bins

Reagents added to cell 1 include $ZnSO_4$ and $Ca(CN)_2$.

Tailings of the lead circuit are pumped to a second conditioner by a 3-in. Wilfley sand pump before entering the zinc circuit, in which there are two machines, like the other, in series. Cells 1 and 2 are cleaner units, and cells 3, 4, 5, 6, 7, and 8 are roughers. Zinc machine No. 2 is a scavenger unit. Conditioned pulp flows by gravity to cell 3 of zinc machine No. 1. Rougher froth goes to cells 1 and 2 for cleaning, and tailings go to the head of machine No. 2, or cell 9. Froth from cells 13, 14, 15, and 16 returns to cell 11 while the product of cells 9, 10, 11, and 12 is sent to cell 5 of machine No. 1. Cells 9 and 13 receive Aerofloat 241.

Tailings from machine No. 2 are passed over a pilot table before being pumped to the disposal area.

In the dewatering and filtering departments there are two 30-ft. thickeners, a 20-ft. thickener, and a 6-ft. Eimco filter containing 8 leaves or disks. One of the 30-ft. thickeners handles finished zinc concentrates, and the 20-ft. unit lead concentrates. The second 30-ft. thickener was used for dewatering leady zinc concentrates formerly produced.

Filtering Concentrates

Of the eight disks in the filter, four treat concentrates from the zinc thickener, and two treat lead concentrates. Filtering lead concentrates is intermittent, generally done every second day for 3 to 4 hours. To make this possible without interfering with the rest of the filter sections, the filter sectors of the two disks handling lead concentrates were fitted in the throat with 1-in. plug valves. When closed, the rest of the filter can be operated without loss of vacuum, air pressure, and operating time.

Water is supplied by the mine, though actually most of the mill operations are carried on with reclaimed water. Fresh water is used only in the lead cleaner circuit. Filter cake from the lead and zinc sections of the filter goes to respective bins, subsequently to be trucked to railroad at Vanadium.

Daily production of ore has been increased from 250 to more than 400 tons during the past year.

Grouped around the headframe are the shops, timber framing shed, hoist and compressor house, change house, office and warehouse, and engineering office. Electric power is furnished by the public service company. A short distance from the mine, the company has recently built a small community with attractive three-, four-, and five-room houses.

Thanks are due L. H. Duriez, manager, and his staff for the courtesies shown me and for the help given in gathering the information here presented.

Mine Statistics Show Rise In Unit Labor Costs

FIGURES recently released by the Bureau of Labor Statistics, Department of Labor, covering the last five years, portray substantial increases in metal-mine unit labor costs, both per unit of ore and per unit of metal. The costs per unit of metal have risen more than those of ore, because of declining ore grades. These costs have increased principally in the last few years, despite the substantial lag in development work in 1942 and 1943. Ore output per man-hour has shown a general increase since 1939, a factor which is also affected by deferred development. Iron-ore output per man-hour has been declining since 1941.

MINE PRODUCTIVITY AND UNIT LABOR COSTS

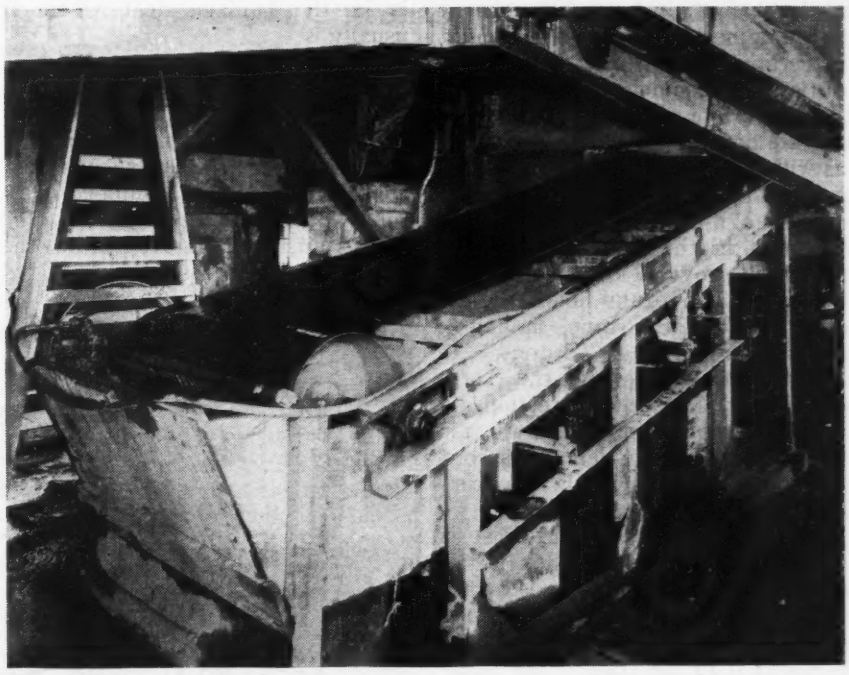
(Basis: 1939 = 100)

Year	Production, (Recoverable Metal)	Wage-Earners	Man-Hours	Metal Output per Man-Hour	Payrolls	Unit Labor Cost (Metal)	Ore Production	Ore Output per Man-Hour	Unit Labor Cost (Ore)
				IRON MINING					
1940		111.2	119.9		121.6		142.5	118.8	85.3
1941		131.2	149.2		170.9		178.6	119.7	95.7
1942		155.3	183.1		221.1		202.7	110.7	109.1
1943		160.2	192.1		247.1		196.0	102.0	126.1
				COPPER MINING					
1940	120.8	116.5	115.9	104.2	122.6	101.5	125.4	108.2	97.8
1941	131.8	130.2	131.4	100.3	150.4	114.1	142.0	108.1	106.0
1942	149.1	134.8	145.4	102.5	191.1	128.2	167.1	114.9	114.3
1943	150.0	131.8	144.4	103.9	212.5	141.7	178.2	123.4	119.1
				LEAD AND ZINC MINING					
1940	112.7	113.8	115.9	97.2	123.0	109.1	116.3	100.3	105.6
1941	122.0	119.2	123.0	99.2	145.4	119.2	133.7	108.7	108.7
1942	127.4	125.0	139.8	91.1	192.6	151.2	144.5	103.4	133.1
1943	120.7	122.1	138.7	87.0	208.9	173.1	152.8	110.2	136.7

Double Pick-Up Features New Magnetic Separator

Additional magnet bank said to give iron-ore concentrator approximately twice the capacity of a single-bank machine

FOR THE PAST TWO YEARS a new type of magnetic separator has been in service in the concentrator of the Richard Ore Co., at Wharton, in northern New Jersey. The Richard company is mining and milling iron ore and is shipping its product to furnaces in eastern Pennsylvania. The development of this separator is the work of M. T. Hoster, consulting engineer for the company, and Martin Brophy, superintendent, in collaboration with J. J. Ferris, president of the Magnetic Engineering & Mfg. Co., at Clifton, N.J.



ONE OF A BATTERY of Hoster wet-type magnetic separators installed in concentrator of Richard Ore Co., Wharton, N.J. Crude ore fed to the machines averages 35 percent iron, tailings run less than 1 percent iron, and concentrates 66 percent. This is a 36-in. machine. Its capacity is about 30 tons per hour.

Two Banks of Magnets

The machine, which is known as the Memco-Hoster wet-type magnetic separator, is a new development in the wet concentration of magnetic iron ores. It differs from the customary wet-type separator in that it has two complete separate banks of magnets, and utilizes the double pick-up. It is maintained, by those responsible for the development of the new machine, that most of the actual separation in separators of this type is accomplished in the pick-up section, so that a machine having two pick-up sections is approximately the equivalent of two ordinary wet-type separators placed in tandem.

Ore to be separated, which has been mixed with approximately three parts of water to one part of solids, is fed into the machine and passes down an inclined tray. It passes under the first bank of magnets, and all magnetic material is lifted up to the conveyor belt and carried across the tailings discharge hopper, where it is delivered on to the second tray.

Together with all dirty water, the tailings are immediately discharged from the machine, thus preventing contamination of the concentrates by this dirty water.

The magnetic portion which has been carried across the tailings discharge hopper is dropped into a feed box, which is part of the second tray. At this point it is remixed with water and flows down the second tray. From this tray the high-grade concentrate is lifted to and carried along the second bank of magnets, being thoroughly washed by sprays and finally discharged at the end of the machine. The second bank is divided into sections. The magnetic intensity of each section is controlled by rheostats which regulate the current input of each section, so that any grade of concentrate can be obtained by regulating the intensity of these magnets.

Material passing down the second tray, which has not been lifted to the magnets, together with any material washed out of the magnetic portion, discharges into the middlings hopper and is returned to the circuit for further treatment.

The machine makes three products: a tailings, a true middling, and a high-grade concentrate.

Size Range 12- to 48-Inch

Machines are built with magnets 12 to 48 in. wide. Capacity on minus-10-mesh magnetite ore containing 35 to 40 percent iron and producing a concentrate of 68 to 69 percent iron is approximately 10 tons per foot of belt-width per hour, so that a machine 4 ft. wide will handle about 40 tons per hour.

The new separator, it is claimed, is simple in operation, requires no adjustments, uses a minimum of water, needs no baffles, dams, overflow weirs, nor discharge valves or spigots. No attention is necessary to maintain water levels. The machine is fed by gravity.

A Cost-Cutting Substitute for Hand Tramming

WALTER S. WEEKS, *Professor of Mining, University of California, Berkeley, Calif.*

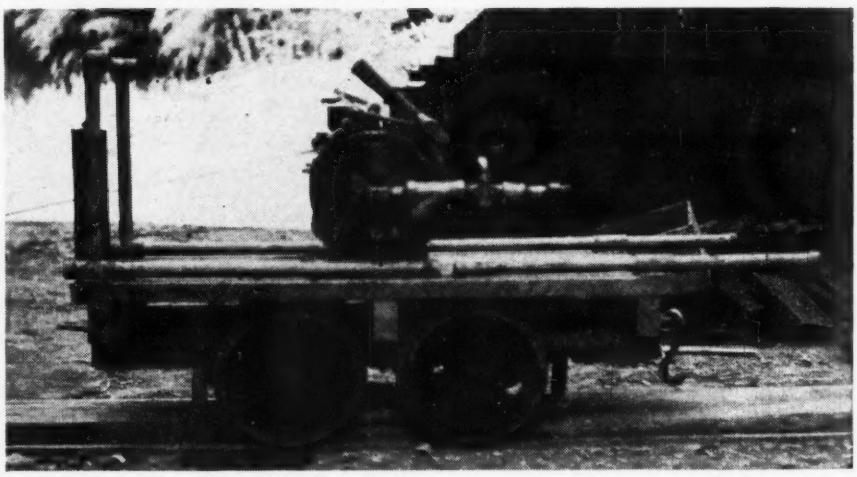
BY THE USE of a mobile compressed-air hoist unit which can be anchored to the mine track and, with the aid of certain devices, can perform the duties of a locomotive, one man can do the work of nearly five hard-working trammers and without fatigue, as will be shown.

The scheme employed centers around a 3-hp. air hoist which is mounted in the center of a light, flat truck provided with handles for pushing. The drum holds 500 ft. of ¼-in. plow-steel rope, having a breaking strength of 2.5 tons. At 500-ft. intervals along the compressed-air line a connection is installed, equipped with an air valve and a quickly-detachable coupling for air hose, which is carried on the truck.

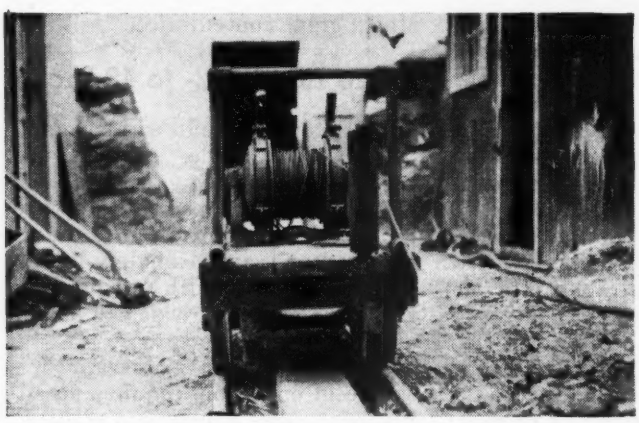
To understand how the hoist is used, let us assume that the truck is on the shaft side of the loaded train which is to be pulled out. The rope which leads from the top of the drum is fastened to the train. The operator then pushes the truck 500 ft. to a line connection, the rope paying out as he proceeds. He anchors the truck, connects it to the air line and pulls the train to the truck. He next removes the anchor and disconnects the air hose and proceeds to the next station. Thus there is no limit to the length of the haul, if the air line is in the haulage drift where it usually is.

Construction, Operation

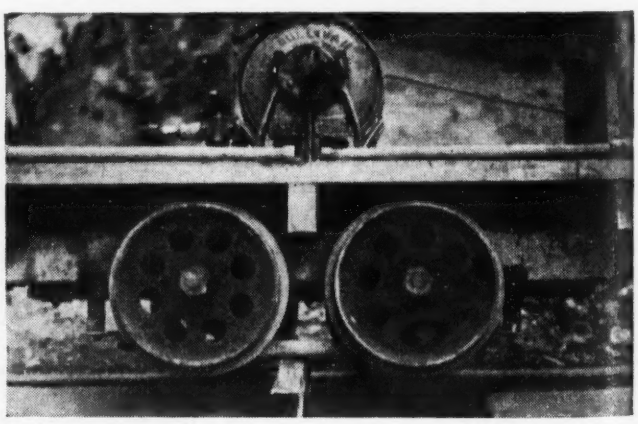
As to construction, the flat car should be as light as is consistent with strength, and equipped with roller bearings. Inasmuch as the truck must be removed from the track in some cases, it is provided with two pipe handles at each end which can be slid outward to give leverage for doing this. It should also be provided with longitudinal skids inside each line of wheels to aid in swinging it. The truck should be wide enough to take the hoist and the pipe levers. The length is unimportant as long as it can hold the hose and accessories. Details of construction can be seen in three of the photographs.



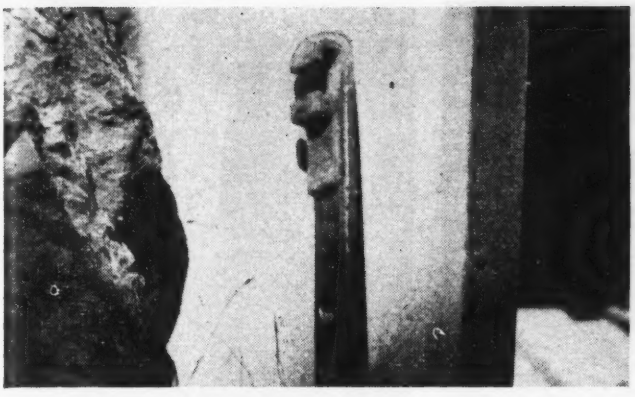
THE HOIST is mounted between wheels. Pipe levers are seen partly extended at one end in this side view of truck. When fully out, they extend 2 ft. 4. in. Pipe construction is of 1-in. pipe.



VERTICAL WOODEN ROLLER seen in this rear-end view leads rope to side of track when it is paying out to keep it from interfering with operator's legs. Pipe levers are shown also.



LONGITUDINAL SKIDS are provided inside each line of wheels to aid in swinging truck. Here the truck is shown blocked upon one of them, preparatory to swinging it around.



TOP ANCHOR (grips top of rail) used in pulling train up to truck is seen in place in right-hand picture. It consists of a flat iron bar having a rail grip at one end and a hole for a hook in the other.

Operation may be explained by assuming that a train has been made up in the mine. The truck is placed on the rails in front of it with the pushing handle toward it. The rope is connected to the train and placed on the outside of the vertical guide roller. The truck is then pushed to the first compressed air station.

The truck is now anchored to the track, with the so-called top anchor. The anchor consists of a heavy piece of flat iron with one end equipped with a grip that fits loosely over the top of the rail. When gripping the rail and taking the strain the bar makes a slight angle with a perpendicular to the rail. The other end of the anchorage bar has a hole for a hook. When the bar is in place, the hole is midway between the rails. The anchor is placed 5 or 6 ft. in front of the truck and connected to it by a piece of wire rope or chain. This anchor, called the top anchor, is shown in place in a picture in the upper right corner, with a separate view of the rail grip.

After the anchor is in place and the air hose has been connected, the train is pulled up to the truck. This cycle can be repeated indefinitely.

To Pull Train Past Truck

In some operations the truck position must be reversed from one end of the train to the other. For example, after the ore has been dumped the truck must be turned around and placed on the mine side of the train ready to pull the empties back. This is done by removing the truck from the track and pulling the train past it. To do this the truck is turned around and placed at the side of the track far enough away to clear the train. It is now anchored by the bottom anchor, which grips the bottom of the rail and sticks outward. This is twice as long as the top anchor. The operator takes the end of the rope, the top anchor and a snatch block and walks a little over a train length in the direction he wishes the cars to move. The top anchor is placed on the rail facing outward, the snatch block is hooked in the hole, the rope placed in the block and then the end of the rope carried back to the train and fastened to it. The train may now be pulled past the truck.

To spot cars at chutes, the cars are first pulled up to them, and the truck is turned around and placed in the passing position. Top anchor and block are placed beyond the chutes. The cars can be spotted one by one. This arrangement places the truck close to the chutes, so that if the man operating it is loading the cars he can reach the truck quickly to move them. If it is found that the hoist will not move the whole of the loaded train against the grade, the following procedure is used. Load as many cars as the hoist can pull against the grade and then pull the whole train upgrade past the chutes. Place the truck on the track and anchor it in hauling position, as many car lengths toward the shaft side of the chutes as there are empty cars to be loaded. The train can now be pulled down grade past the chutes, and the operator will have to walk only a short distance to the truck.

If the operator is merely spotting and not loading, the empty train is pulled upgrade past the chutes and the truck is then anchored in hauling position a train length toward the shaft from the chutes.

Selecting the Air Hoist

A suitable hoist would be a 3-hp. unit. It must be light enough for the assembly to be moved about by one man. The one shown is rated at 3 hp. and has a rope pull of 1250 lb. and a rope speed of 90 ft. per minute at 80 lb. per sq. in. gage pressure. Its weight is 175 lb.

At first thought it might appear that the hoist should be geared up to a rope speed of about 4 m.p.h., but consideration shows that for a given rated horse-power, the most ore can be hauled by a hoist with the largest rated pull and the slowest rated speed.

Let X = distance to be hauled
W = speed at which truck is pushed
S = rope speed
P = rope pull
C = time for anchoring

Time to make the trip is:

$$\frac{X}{W} + \frac{X}{S} + C$$

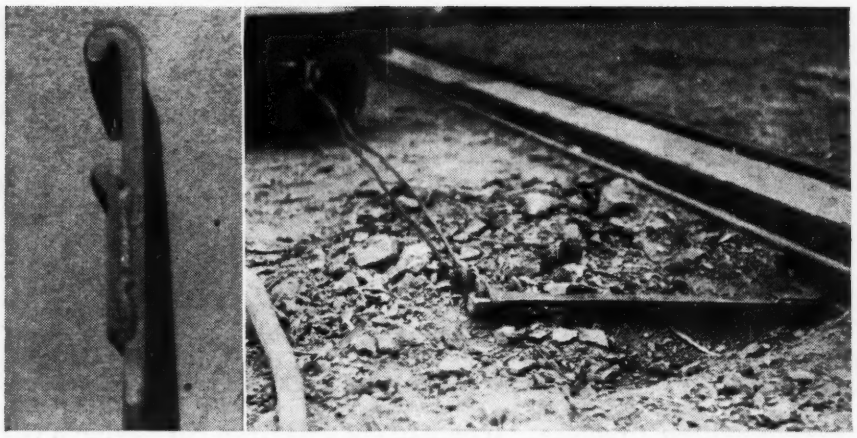
Let R = Resistance of 1 car.

Number of cars that can be hauled is $\frac{P}{R}$, so time to pull one car the given distance is: $\frac{RX}{PW} + \frac{RC}{P} + \frac{RX}{PS}$

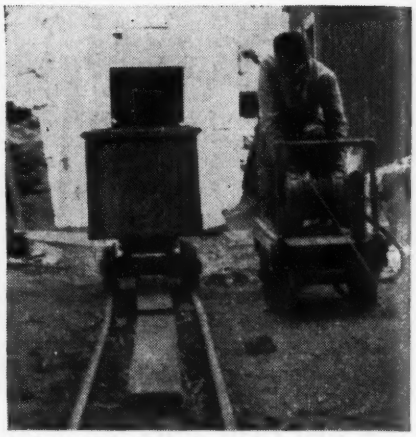
For a given horse-power $P \times S$ is constant, so time to pull one car the distance is: $R\left(\frac{X + WRC}{PW}\right) + a$ constant. This shows that for a given horse-power, the greater the pull the less is the time required per car.

Time Required for Various Operations

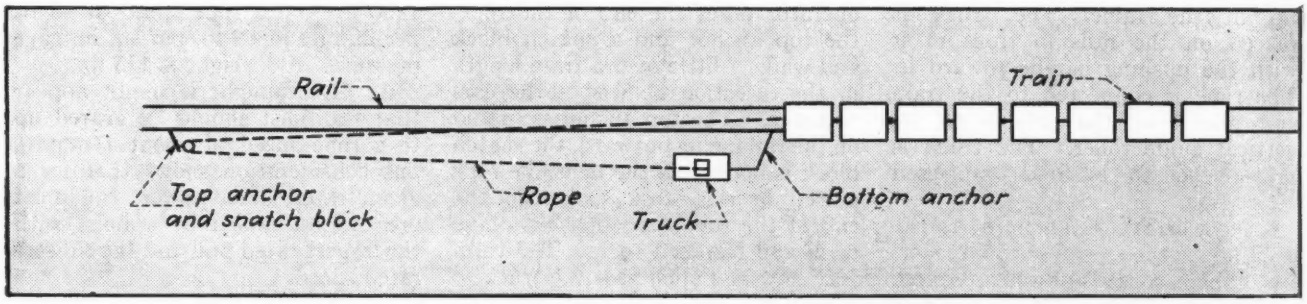
Rate of pushing	270 ft. per min.
Time to anchor and prepare for pulling	0.5 min.



BOTTOM ANCHOR, which grips bottom of rail, is in place here. The grip is seen at left. The respective functions of this and the top anchor, shown on page 87, are explained in the text.



TRUCK HAS BEEN REMOVED from track in order that car may pass it. Compare with drawing.



TO PULL TRAIN PAST TRUCK this set-up is used. It utilizes both the anchors and a snatch block.

Time to take up anchor and prepare for hauling	0.5 min.
Time to prepare for passing	3.0 min.
After passing, time to prepare for hauling	4.0 min.
Time to remove from or replace truck on rails	0.5 min.

To gain an idea of the capacity of this system, a haulage problem will be assumed. The time calculated will be for haulage operations only and will not include dumping and loading time.

The haul is 1000 ft. from chutes to shaft. The hoist has a rated pull of 1250 lb. and a speed of 90 ft. per min. Each car weighs 1000 lb. empty and carries 1 ton of ore, and is equipped with roller bearings. Grade of track is $\frac{1}{2}$ percent toward shaft. Twenty cars will be hauled, so the loaded train weighs 30 tons. Available pull for loaded train for friction and acceleration = 1250 + 300 = 1550 lb. The 300 lb. is the help of the grade.

Pull available per ton = $\frac{1550}{30}$ = 51 lb. which is sufficient.

Pull available per ton for empties:

$$\frac{1250 - 100}{10} = 115 \text{ lb.}$$

Time for pushing truck: $\frac{2000}{270}$ =	7.5 min.
Time for hauling: $\frac{2000}{90}$ =	22.0 min.
Time for 4 anchorings for hauling	4.0 min.
Time to prepare for passing at dumps and at chutes	6.0 min.
Time to prepare for hauling at dumps and at chutes	8.0 min.
Total time	47.5 min., say 48 min.

Tons per hour = 25

Useful ton miles per tramming hour $\frac{1000 \times 25}{5280} = 4.7$

According to Peele, the average output of a hand trammer is one useful ton-mile per hour, so the haulage arrangement enables one man to do the work of nearly five hard-working trammers, and with no fatigue on account of rest periods.

Additional Comment

Curves can be negotiated by placing vertical rollers on them.

A lock can be placed on the hoist clutch so that the operator will not have to hold it on after train is started.

If a mine has too much grade so that cars tend to roll, a brake can be placed on the end cars, so constructed that it engages if rope slackens. The brake on rear car is locked so that it will not operate. A rope section with largest possible outside wires consistent with proper flexibility should be used. The Seale patent would be suitable.

Permanent anchorage can be installed at each haulage station if desired. Such an anchorage would be an eyebolt in each side of the drift and a wire rope to hook across the drift.

I am indebted to Sullivan Machinery Co. and to B. P. Lane, its district manager, for the loan of the hoist, and to Prof. Bernard York for discussion, and to our mechanics Henry Bachman and Loyd Crawford.

Exploration Spotlight on Canadian Mineral Areas

MINES AND GEOLOGY BRANCH, *Department of Mines and Resources, Ottawa, Canada*

EMPHASIS is being placed in the news of the day on the importance of exploratory and development enterprises now under way in various mineral areas throughout the Dominion. Increasing attention is being given to such work, though in most of these areas the operations are largely restricted to the staking of claims, reconnaissance surveys, and exploratory drilling, owing mainly to the shortage of labor and the difficulty in obtaining supplies and equipment under wartime conditions. Most of this study is being devoted to properties within easy reach of producing mines or of rail transportation. In general, the activities which will be discussed are in part a reappraisal of the mineral possibilities of the areas concerned.

To afford an idea of the nature, extent, and importance of these developments, brief accounts are given here of the principal operations in certain selected areas.

Yellowknife-Beaulieu River Area, Northwest Territories. Interest has been centered chiefly in developments at the Giant Yellowknife gold property, where recently diamond drilling has disclosed the presence of an exceptionally large ore zone. Core samples show a gold content of about half an ounce to the ton, though no definite information on the grade of the deposit will be available for some time. Drilling of the zone, which lies close to the main deposit, is continuing. Recently, announcement was made of the disclosure of another mineralized shear zone about 6,000 ft. north of the zone mentioned. These developments are of special interest because of the size of the zones, the other gold deposits in the area being small, though for the most part of high grade.

Although gold is the metal of chief importance in the area, there are also occurrences of copper, lead, zinc, indium, tin, tantalum, columbium, lithium, and beryllium mineralization. Lead and zinc sulphides occur in shear zones on properties about 12 miles north of Yellowknife and in a belt about 50 miles long and 5 miles wide extending from Ross Lake to Turnback Lake.

In 1943, field parties of the Canadian Geological Survey disclosed the presence of tantalum, columbium, lithium, and beryllium mineralization in pegmatites in the Beaulieu River area. The occurrences are small, but the dikes are plentiful. At Sproul Lake an occurrence of cassiterite was disclosed that extends for a length of 400 ft. with an average width of 18 in. The McDonald dike, about 50 miles east of Yellowknife, showed a 30 percent content of spodumene over an area 400 ft. long and 22 ft. wide. It was estimated to contain also more than 75,000 lb. of tantalite. Beryl was observed in many of the dikes, but no occurrence of this mineral that was of economic interest was found.

Only a small part of the Yellowknife-Beaulieu River area has been intensively prospected.

Pinchi Lake, Takla Lake Area, British Columbia. Cinnabar was discovered on the north shore of Pinchi Lake in 1937 by an officer of the Canadian Geological Survey. An option on the claims was secured by Consolidated Mining & Smelting Co., and in June, 1940, a reduction plant with a capacity of 50 tons a day was brought into production. Capacity was later increased to 1,000 tons a day, and by the end of 1943 a total of 3,433,744 lb. of mercury had been produced. Recently, the output of the metal was progressing at a rate of 1,000,000 lb. of mercury a year.

About 90 miles northwest of the Pinchi Lake property, Bralorne Gold Mines, Ltd., is operating the Bralorne Takla property, which started producing in November, 1943. The ore averages 8 to 10 lb. of mercury a ton and is being treated in a 50-ton mill.

The Pinchi Lake and Bralorne Takla deposits occur in a mercury

USING THE ULTRAVIOLET LAMP in prospecting for tungsten in Yukon Territory, three men shut out the daylight as they inspect the freshly broken surfaces while lying prone. This and other photographs by courtesy of Department of Mines and Resources, Ottawa.

YELLOWKNIFE SETTLEMENT, in Northwest Territories, on the shore of Yellowknife Lake. This community is the center for prospecting activity in this part of the Dominion.

belt that lies along a major fault zone extending from a point southeast of Fort St. James, 150 miles northwest, to the Omineca River. The zone varies in width from 200 to 5,000 ft., but in most places does not exceed 1,000 ft. Cinnabar is the only important mineral.

Production from these properties has been far in excess of Canadian needs, and a large part of it is exported. According to recent reports, operations at Pinchi Lake are to be discontinued shortly, because of market conditions.

Flin Flon-Herb Lake Area, Manitoba. This area has been extensively prospected during the past few years in a search for deposits of base metals and gold, the most noteworthy result being the discovery of a large deposit of gold of workable grade at Snow Lake. The deposit has been explored by 50,000 ft. of diamond drilling by Howe Sound Exploration Co. Underground development will be done after the war.

Sherritt Gordon has done considerable drilling in the vicinity of the Sherritt Gordon mine. This disclosed the presence of a copper-zinc deposit beneath Bob Lake, though the ore is probably too low in grade to permit profitable mining under present conditions. The company is now exploring a large block of ground east of its mine.

Hudson Bay Mining & Smelting Co. recently tested the Thompson property by drilling, and reports finding four small lenticular copper-zinc deposits of good grade. Several other companies and many prospectors have also been working in the area.

Steep Rock Lake Area, in Western Ontario. Interest is centered chiefly in developments on the property of Steep Rock Mines, Ltd., where work toward bringing large deposits of hematite into production is under way.

Discovery of what later became known as the "A" orebody was made in March, 1938. By 1943 the existence of three orebodies had been established, all of which lie beneath Steep Rock Lake. The "A" orebody is 3,100 ft. long and from 175 to 200 ft. wide; "B" body has been traced for 4,800 ft. and is from 85 to 225 ft. wide; "C" body is incompletely defined as yet but has an inferred length of 800 ft. The orebodies occur in three sharp bends in the central part of the M-shaped lake.

Roberts and Crago, the company's engineers, estimate that the proved ore blocked out to a depth of 600 ft below the lake level in the explored parts of the "A" and "B" bodies amounts to 16,758,000 tons, of which 15,709,000 tons will be recoverable by open-pit mining when the lake is dewatered. A further 14,000,000 tons of probable ore is estimated and a much larger tonnage of possible ore is visualized. A total of 15,233,000 tons of the proved ore is in the "B" body, and 12,933,000 tons of this is classified as "standard," the average analysis being:

	Percent
Natural iron	56.25
Silica (dried analysis)	3.40
Sulphur	0.043
Phosphorus	0.023

Associated with this high-grade natural ore are pyrite-bearing phases of the deposits classified as "high-sulphur" and "sulphide" ores that will require beneficiation.

During 1943, work on diverting the Seine River into the west arm of Steep Rock Lake was completed and the eastern part of the lake was dammed off from the west arm. Pumping of the eastern part was begun Dec. 15, 1943, and by Jan. 4 all of the 14 large electric pumps were in operation. The amount of water to be pumped is estimated at 121 billion gallons, but mining can be started on the upper part of "B" orebody when 80 billion gallons have been removed. It is anticipated that the mine will be in production in August, 1944.

The Dominion Government has agreed to pay the cost (estimated at $300,000) of a four-mile spur railway from Atikokan station to the mine and is also building ore docks at Port Arthur at an estimated cost of $2,500,000. The Canadian National Railway is supplying 250 ore cars;

A LARGE QUARTZ VEIN carrying scheelite is seen here, at Gordon Lake, in the Yellowknife area, after stripping operations have laid it bare.

and the Ontario Hydro Electric Power Commission has built a 110,000-volt power transmission line from Port Arthur to the mine at a cost of $1,400,000.

The Main Gold Belts in Ontario and Quebec. Various mining groups are reported to have acquired, by purchase or by staking, large blocks of ground along the two main gold belts in Ontario and Quebec, more especially along the northern belt. There is much exploratory activity, also, along the southern belt, particularly in western Quebec.

The terms "northern gold belt" and "southern gold belt" are used in a somewhat general way. The northern belt is considered as extending from Porcupine, in Ontario, eastwards past the Temiskaming & Northern Ontario Ry. and through the Lightning River area into Quebec. From the Ontario-Quebec boundary it extends eastwards past the Beattier mine, in Duparquet Township, and then divides, with one branch continuing east at least past Figuery Township, and the other probably joining what is known as the "K" zone at the Siscoe mine. It is now thought by geologists that this zone or belt, like the southern belt, may be marked by a great fault, which may have an over-all length of 150 miles.

Of the southern belt the Quebec portion is a major fault zone that extends westward from Bourlamaque Township into Beauchastel Township. Geologists have recently pointed out that this zone may continue westward beneath the late Precambrian Cobalt conglomerate and reappear in Ontario as the Larder Lake-Kirkland Lake fault. For convenience, the southern belt is considered as extending westward through the Larder Lake and Kirkland Lake camps, in Ontario.

Much of the northern belt has a heavy overburden, and geophysical methods of prospecting will probably be used extensively in preliminary exploration. Comparatively little information has been published, however, as to the exploration under way or contemplated along the northern belt.

Most of the exploratory activity in the southern zone is along the Quebec portion of the belt, where extensive diamond drilling is under way. All of the chief metal mines in western Quebec with the exceptions of Beattie, Normetal, and Belleterre are along this zone. The present trend of exploration is eastwards from Bourlamaque Township, as it is considered that the structure should continue across Louvicourt and other townships. Little information is available on results to date, except that those at the Obaska property, in Louvicourt Township, have been encouraged.

Iron Ore Deposits, Quebec-Labrador Boundary. Labrador Mining & Exploration Co., Montreal, discovered six iron deposits on its Labrador Concession during the seasons of 1936 to 1939, inclusive. The concession has an area of 20,000 sq.mi. and is about 280 miles north of Seven Islands, in the Gulf of St. Lawrence. The company also has a concession in an adjoining area of 3,900 sq.mi. in Quebec. The principal deposit, located at Sawyer Lake, in Labrador, is estimated by the company to contain 2,200,000 tons of ore averaging 65 percent iron per 100 ft. of depth. Four of the other deposits are of good grade and one is rich in manganese. The sixth deposit has a high silica content, though the tonnage is believed to be large. Attention has been focussed on locating new orebodies by exploration and reconnaissance work. Several bodies of ore of apparently good grade were found.

This year the company has planned to have four diamond drills in operation. It also plans to have four geological parties and five prospecting parties in the area. Transportation of men and equipment will be by airplane.

Hollinger Consolidated Gold Mines, Ltd., has a controlling interest in the Labrador company.

Decline in Domestic Bauxite Output Due to Three Factors

MINE PRODUCTION OF BAUXITE in the United States during the first quarter of 1944 (816,426 short tons) reached the lowest monthly level since June 1942, averaging less than half the monthly production during the final quarter of 1943, according to the U. S. Bureau of Mines. The progressive decline in production which began in the fall of 1943 is the result of three factors: (1) The attainment of government and industry stockpiles nearly equal to a full year's consumption at the present rate; (2) the cutback of the alumina and aluminum program by the War Production Board, resulting in a drop in consumption of about 110,000 tons a month from the last quarter of 1943 to the first quarter of 1944; (3) assurance that Canada's needs can be met from South American sources, thus removing the possibility of large export shipments of dried ore from Arkansas. As usual, the largest share of the output during the first three months was from Arkansas, with Georgia and Alabama trailing far behind, in that order.

Production, Consumption, and Stocks of Bauxite. Short dry tons

	Domestic Production			Domestic Consumption	Stocks at End of Period	
	Arkansas	Other States	Total		Mines and Processors	Consumers[a]
1943						
1st quar.	1,348,045	48,439	1,396,484	1,018,229	349,360	2,126,966
2d quar.	1,657,976	54,800	1,712,776	1,260,138	347,476	2,815,436
3d quar.	2,171,599	52,443	2,224,042	1,489,929	475,880	[b]
4th quar.	1,655,967	55,261	1,711,228	1,563,855	552,466	4,267,402
Total 1943	6,833,587	210,943	7,044,530	5,332,151		
1944						
January	254,615	10,346	264,961	417,504	569,277	4,227,186
February	245,617	11,137	256,754	402,780	563,314	4,130,912
March	286,028	8,683	294,711	421,963	579,542	3,996,635
1st quar.	786,260	30,166	816,426	1,242,247		

[a] Includes government stockpiles. [b] Not available.

Preheater Improves Results at Chino Smelter

JOHN B. HUTTL, *Associate Editor*

Better combustion in the reverberatory without supplementary burners is the chief advantage. A higher over-all efficiency results.

USE OF PREHEATED AIR in the reverberatory furnace of a copper smelter burning natural gas or oil as fuel is distinctly a new development, despite the fact it has already found wide application in power generation and in steel, cement, lime, and numerous other industrial plants. The air preheater recently installed at Kennecott's Chino smelter, at Hurley, N. M., is perhaps the first of its kind on the American continent.

Better Practice Sought

This installation was made as the result of a comprehensive investigation of furnace design and operation by the management, with the object of improving smelting practice. Particular attention was given to the firing end of the furnace. Though research and study are being continued, results attained so far have made it possible for one reverberatory furnace using natural gas for fuel to handle current war production without supplementary burners, demonstrating clearly the advantages that may be derived from the use of preheated air.

Chief among these advantages is that of improved combustion, resulting in higher over-all efficiency. In the Chino reverberatory furnace operations, improved combustion has resulted in higher temperatures in the interior of the furnace, consequently bringing about more rapid smelting of the furnace charge.

Before continuing with a description of the air preheater plant, which has aroused considerable interest among smelter men, a brief sketch of the smelter layout and equipment employed may help round out the story. Concentrates and other copper-bearing materials such as flue dust, Cottrell plant dust, waste-heat boiler dust, and precipitates are smelted in a 32x126-ft. reverberatory furnace of the wet-charge type, with the charge being distributed along the furnace by two vibrating conveyors. The furnace is fired by natural gas, as mentioned previously, through a multiple-jet low-pressure burner installation (eight individual panels), using gas at 3½-lb. pressure. Waste-heat equipment consists of two Stirling-type boilers with a heating surface of 12,600 sq.ft. each and designed for 525-lb. pressure and 750-deg. superheat.

Resultant reverberatory matte is blown into blister copper in two 13x30-ft. basic-lined Peirce-Smith converters, each equipped with 52 tuyeres. Blister copper goes successively to a gas-fired holding furnace, a refining furnace, and then to the molds of a circular casting machine.

The Preheater Layout

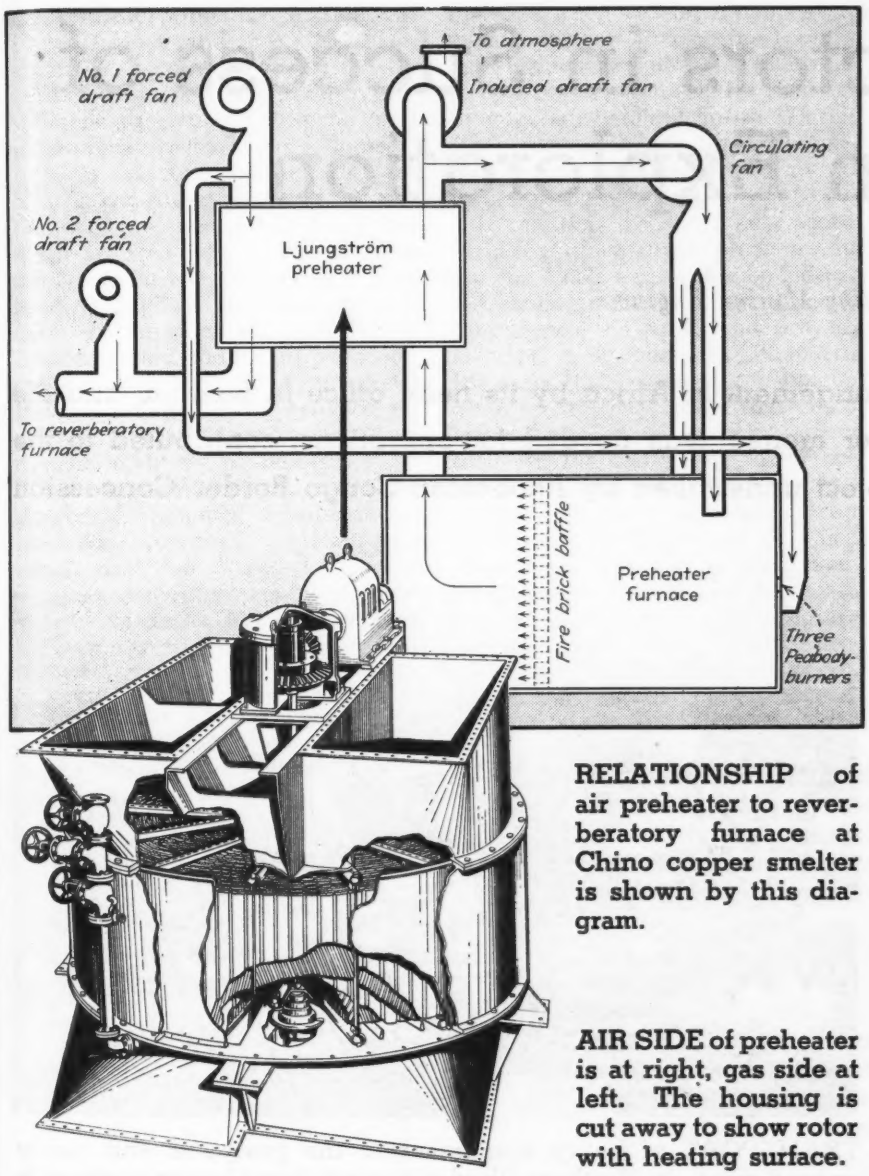
The layout of the air preheater plant serving the reverberatory furnace is shown in a drawing. As will be noted, it consists of a separately fired preheater furnace, and the preheater proper, with fans and control equipment. The preheater is a Ljungstrom 19½-V-72 unit employing the continuous regenerating principle. Its rated capacity is 53,000 c.f.m., the air being received at 60 deg. F., 24.45 in. of mercury, and heated to 926 deg. F. The regenerative principle is effected by the use of a slowly moving rotor containing the heating surface. Each revolution produces a complete cycle of exchange, in which heat from the hot gases is constantly absorbed by the metal plates and released as the rotation moves them into the path of the combustion air.

Heating by Rotor

The housing of the preheater is divided into two outside compartments and a center compartment containing the rotor with its heating elements. The outside compartments bolted to the center compartment are divided by partitions confining the flue gases to one side of the preheater unit and the air to the other. All flanges for bolting the sections are machined to prevent air from filtering into the assembled unit.

Complete with its heating element the rotor is 14 ft. 4½ in. in diameter, 6 ft. 3½ in. high, and revolves at about 3 r.p.m. Power is furnished by a 5-hp. motor through a speed reducer unit (ratio 1959:1) installed on top of the preheater. The heating element resting on radial bars is made up of a series of steel plates, one plain and one corrugated (corrugation is co-axial to center line of preheater), set to give a $\frac{1}{16}$-in. space to provide passage for the gases on the gas side to heat the element, and for the combustion air on the air side, where the heat absorbed by the element is given up. Cross-sections of the air and gas sides contain 52.19 sq.ft. and 62 sq.ft. respectively. To provide increased resistance to heat, about 24 in. of heating element is made of steel alloy sheets containing 4 to 6 percent chrome.

Of firebrick construction with a steel-frame reinforcement, the preheater furnace is fired by natural gas through three Peabody burners, fuel



RELATIONSHIP of air preheater to reverberatory furnace at Chino copper smelter is shown by this diagram.

AIR SIDE of preheater is at right, gas side at left. The housing is cut away to show rotor with heating surface.

consumption being about 10 percent of that prevailing at the reverberatory furnace. The combustion chamber of the furnace is relatively small. Temperature of the generated product is about 2,300 deg. F. This is too high for the chrome-alloy heating element of the preheater, which is good for only 1,000 deg. F. As a consequence, sufficient spent heating gases are recirculated to reduce the temperature of the heating gases entering the preheater to 1,000 deg. F., or less. To effect proper mixing, the spent heating gases are introduced into the preheater furnace at about 270 deg. F. through four ducts. Another aid is the perforated firebrick baffle in the furnace proper.

Fan equipment used in the air preheater installation consists of the following units:

1. Main or No. 1 forced-draft fan. Capacity 54,000 c.f.m. at 100 deg. F., 13 in. H_2O, 24.14 in. mercury, requiring 154 b.hp. at 868 r.p.m. It is direct-connected to a 150-hp., 870-r.p.m. motor. The fan forces the air through the air side of the preheater to the reverberatory furnace. A portion of the air is bled off ahead of the preheater intake and is directed to the burners serving the preheater furnace.

2. No. 2 forced-draft fan. Capacity 35,000 c.f.m. at 100 deg. F., 9 in. H_2O, 24.14 in. mercury, and requires 69 b.hp. at 855 r.p.m. It is powered by a direct-connected 75-hp., 860-r.p.m. motor. The fan provides tempering air to be mixed with that leaving the preheater at 810 deg. F. The mixed product subsequently goes to the reverberatory at 600 deg. F. through a 46-in. insulated steel pipe.

3. Induced draft fan. Capacity 20,000 c.f.m. at 9 in. H_2O, 24.14 in. of mercury, and requires 40 b.hp., at 1,287 r.p.m. It is driven by a belt-connected 50-hp. motor operating at 870 r.p.m. The fan draws the heating gases through the gas side of the preheater to the atmosphere, maintaining minus 0.05 in. water in the combustion chamber of the preheater furnace.

4. Recirculating fan. Capacity 50,000 c.f.m. at 347 deg. F., 9 in. H_2O, 24.14 in. mercury, and requires 100 b.hp. at 835 r.p.m. It is driven by a direct-connected 150-hp., 870-r.p.m. motor, and its function is to recirculate sufficient spent heating gases to maintain the desired gas temperature at the gas-side intake of the preheater, which, as mentioned previously, is 1,000 deg. F., or less.

Control by Damper

Primary control of the entire installation is by regulation of the hand damper on the discharge of the main forced-draft fan. Any alteration effected at this point will bring about automatic adjustment of all other units in the system, except reverberatory gas. Control of the final air temperature at the reverberatory furnace by addition of tempering air furnished by No. 2 forced draft fan, instead of in the preheater proper, reduces greatly the power required by the fans, especially on the recirculating fan. Insulation of the 46-in. pipe line mentioned before and of other plant units is done with rock wool.

Dutch Oven a Feature

A feature that has contributed materially to the success of the preheater installation described is the Dutch oven at the firing end of the reverberatory furnace providing a uniformly high temperature. It is well known that when an attempt is made to generate a flame in "sight of" any appreciable amount of surface which will absorb heat by radiation, heat is absorbed so rapidly that the flame temperature will not rise to a "high peak." On the other hand, if a flame is generated without any appreciable amount of good radiation-absorbing surface in "sight of" it, a relatively "high peak" temperature may be attained. The oven in question is 9 ft. deep, 42 in. high, and sufficiently wide to accommodate the eight burner panels serving the reverberatory furnace. Magnesite brick is used exclusively in the construction of the Dutch-oven roof.

Other Factors in Success of Rhodesian Exploration

RAYMOND BROOKS, *Consulting Mining Engineer*

The free hand given the management in Africa by its head office in London, and the instant provision of whatever money was needed for operations, contributed to the amazing outcome of the project undertaken by Rhodesian-Congo Border Concession

I HAVE PURPOSELY emphasized the importance of the work and observations of practical prospectors like Collier, Moir, Bell, Merry, Clack, and others, in the two articles[1] that have preceded this, dealing with the early days in the Rhodesian copper district. They were not engineers, and some of them lacked other advantages of education, but they knew the bush, knew the natives, and they had sound judgment about ore and where it might be found. To them should go much of the credit for finding and proving the now famous copper mines of Northern Rhodesia. It is my earnest plea that engineers, geologists, and companies that have to carry the responsibility of finding new sources of the various metals will give increasing recognition to the importance of encouraging, stimulating, rewarding, and listening to this great breed of men, who can still be found in most corners of the world and who have contributed so much to the mining business.

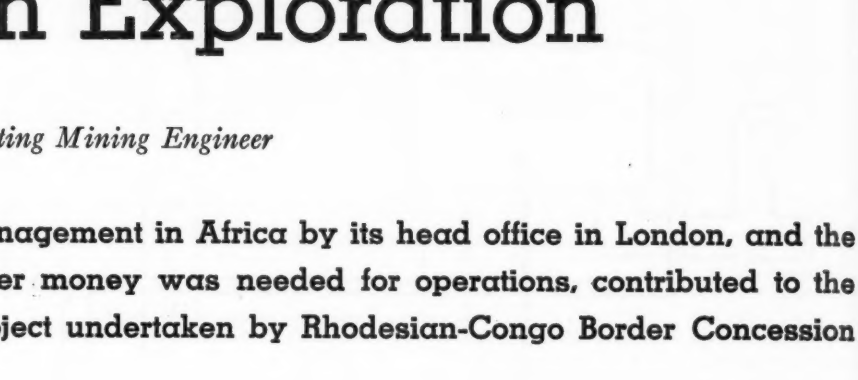
Two other important factors entered into the successful accomplishment of this big exploration job in Africa.

Ample Funds

First, all of the money required for operations in Rhodesia was provided for four years without hesitation or question. The manager cabled to London each month stating his needs, and within five days the funds were invariably in his checking account in Bulawayo, Southern Rhodesia, the nearest British banking point, 700 miles from the copper region.

Second, all operations in Rhodesia, including the selection of personnel engaged in Africa, the selection of discoveries on which work was to be done, and the planning of programs, were left exclusively to the consulting engineer of Minerals Separation, P. K. Horner, and in turn by him to the manager in Africa. Horner, on each annual trip from London, discussed progress, programs, and essentials, and then left the running of the job to me. I emphasize this feature of the administrative part of the undertaking because I am certain that many important discoveries would not have been made if the engineer in charge had not been free to work where he saw fit and to any extent he thought advisable.

N'Changa is a very good example to cite. Horner and I, in July, 1923, had tried unsuccessfully to find the place described by one of our parties of prospectors, Beaten and Osterburg, where they had seen copper stains in a small quartzite outcrop beside a stream called N'Changa. This had been shown to them by the headman of a village, 8 miles away, named Kapopo. Later I sent Collier from Chambishi to find the place, and it was he who decided to trench the swampy ground between two lines of small outcrops, one of which showed faint copper carbonate stains, and it was his fourth trench, called "F," in which he finally uncovered the 140 ft. of 4½-percent ore already mentioned. I did not see the mine until Collier had dug down to ore at this point.



TRANSPORT of heavy equipment to the prospects and newly opened mines in Northern Rhodesia necessitated heavy work, with high cost for road construction. Here a boiler is being freighted by steam haulage to N'Changa on the road from Tshinsenda.

Cooperation at N'Changa

Subsequent successes at N'Changa in finding the main ore beds were

[1] *"How the Rhodesian Coppers Were Found," E. & M. J., May, 1944, pp. 80-83 inclusive. "Native Aid Important in Finding Rhodesian Coppers," E. & M. J., June, 1944, pp. 83–85 inclusive.*

the result of close cooperation between Collier and me, based on knowledge gained previously by both of us in the Congo, and by my willingness as manager to spend company money to back our judgment. It is no reflection on the judgment of our consulting engineer to say that the first three drill holes put down at N'Changa in the oxidized formation on the Dambo lode were so discouraging that he instructed me to discontinue work at 480 ft. in the fourth hole, and it is no particular credit to me that I kept on against these orders because I believed we would find sulphide ore if we got deep enough on the dip of the beds.

Surface trenches 400 ft. apart had showed the following results, and it was these trenches in oxidized material that had caused four other visiting American engineers previously to turn thumbs down on the commercial possibilities of the occurrence:

Trench	Width Sampled, Feet	Copper, %
No. 1	310	1.45
No. 2	200	2.19
No. 2	150	1.65
No. 3		1.76
No. 4		2.16

Drill hole No. 1, on the downward dip of this Dambo lode, showed 1.9 percent of oxidized ore to a depth of 300 ft., when it was stopped.

Drill hole No. 2, which was not located in surface ore, was stopped at 85 ft. because of casing difficulties.

Drill hole No. 3 showed oxidized ore as follows: 2.1 percent to 70 ft.; then 0.6 percent for 175 ft.; then 1.6 percent for 150 ft.; then 3.5 percent for 55 ft.; then 2.5 percent for 70 ft.; total, 520 ft.

Drill hole No. 4, which was down to 480 ft. when we were instructed to give up further work on the Dambo lode, ultimately showed the following results: No values to 445 ft.; then 1.5 to 2 percent oxidized ore to 575 ft.; 5.2 percent sulphide ore with oxidized bands to 650 ft.; below this, no values of consequence.

It was that disclosure of a width of 75 ft., principally sulphide ore, in the No. 4 hole on the Dambo lode at N'Changa, in the late part of 1925, that tipped the scales and proved, for the first time in Northern Rhodesia, the existence of sulphide ore of commercial grade that could be concentrated by flotation. From then on, the search for similar ore was steadily pushed by drilling and sinking at N'Changa, the Roan Antelope, and N'Kana, all of which showed its existence in thick synclinal beds when sufficient depth was obtained. Successes there led to geological study and drilling by Selection Trust at Mufulira, which resulted in finding two more orebodies of great importance.

Explorations Planned

A general plan for explorations was laid out by P. K. Horner in London. The selection of myself to take charge in Africa came about because of my recent experience in the Congo as manager of the Western mines of the Union Minière du Haut-Katanga. It was thought that we might find deposits on the British side of the Congo-Rhodesia border of a type similar to those in Katanga. The chairman of Minerals Separation, Francis Gibbs, was also chairman of Rhodesian Congo Border Concession, Ltd., from its inception in 1922 to about 1930, and the secretary of Minerals Separation, H. C. Hawkins, was secretary of R.C.B.C. during the same period. Minerals Separation was appointed manager in London and P. K. Horner, as consulting engineer for that company, represented it on his annual trips to Africa; otherwise the manager in Africa was responsible for results.

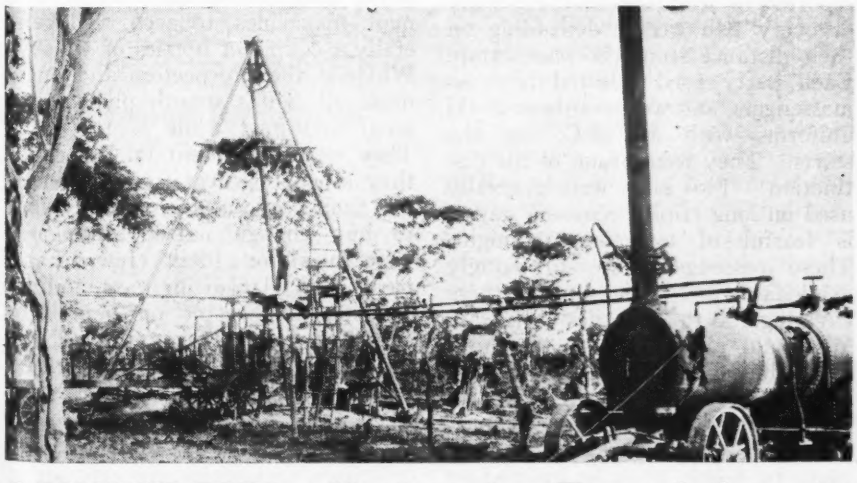
Complete camping equipment for ten prospecting parties of two men each had been ordered in London, and it arrived in Rhodesia promptly. Horner and I met in Bulawayo and proceeded north to N'dola to set up some sort of headquarters and get started. With us were two young men, Tucker and Daniels, the former an accountant, who had been engaged in Johannesburg and who is now the manager of the Mufulira mine. The latter, engaged in England, was our first field engineer. A one-room office was established in the back of the small home of John Thom in N'dola. At first I lived at the Bwana M'Kubwa mine. There were no other accommodations anywhere in the region, and the only motor road was a track connecting Bwana and N'dola that had been cut by George Broadbridge, manager of Bwana M'Kubwa, so that he could go between the two places with his motorcycle and side car. There were six Europeans besides my wife and me living at Bwana and about seven families in N'dola, which was the seat of government for that district.

First Prospector Hired

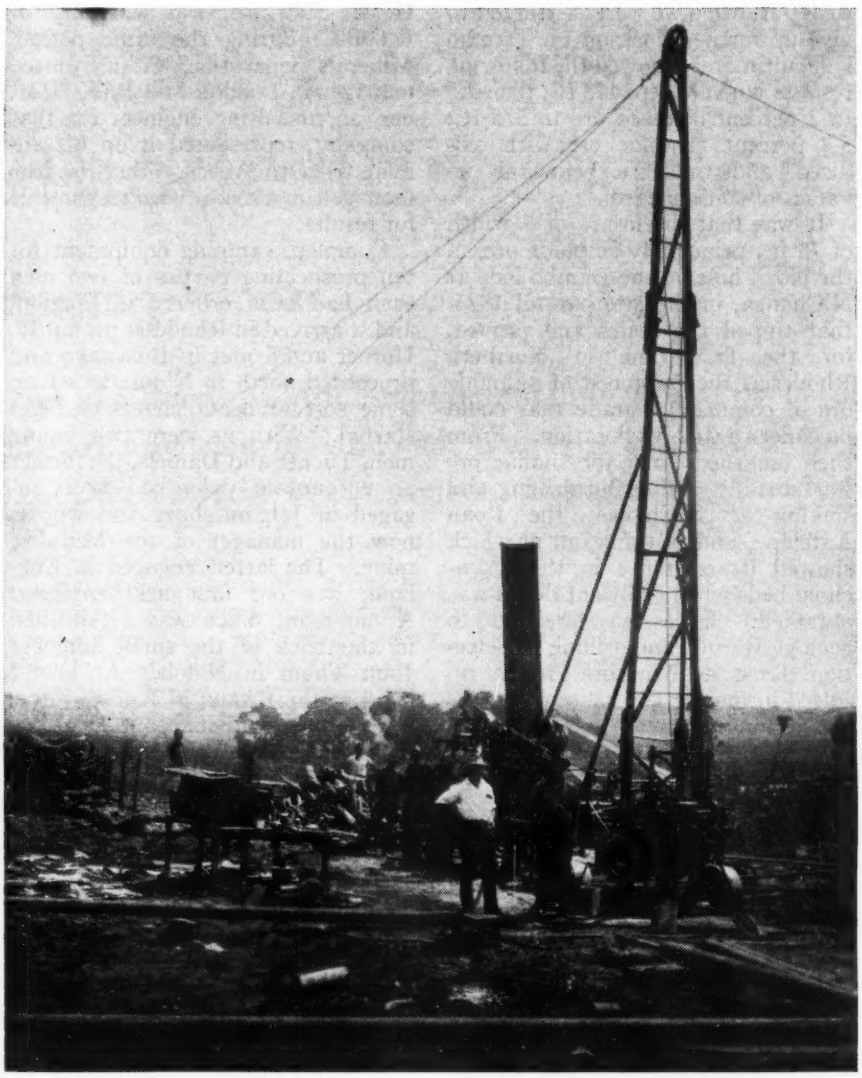
A Cornish prospector named Jack Merry, who had worked with me in the Congo and had had long experience in the Rhodesian bush, was waiting at Bwana and was the first prospector hired by R.C.B.C. His first job, started the next day, was picking a route for a road from N'dola to N'Kana, 35 miles distant. All travel away from the railway at that time was on foot over native paths. My first trip from N'dola to N'Kana was on a bicycle trying to keep up to an expert native mail boy who made the trip every week.

Faster Tempo

From then on things moved rapidly. Other young engineers arrived from England, and other prospectors were engaged in the country. News of the undertaking got about and men began to write from South Africa and came in from the Congo and Southern Rhodesia looking for jobs. The twenty tents and outfits were set up in two rows in N'dola and a tea party was given



A DIAMOND DRILL at Munshewemba. These and other equipment of the kind were steam-driven and to supply them every available boiler in southern Africa was acquired.



A SHOT DRILL at N'Changa. Like the other exploratory drilling equipment used, it is steam-driven, local wood being used for fuel in portable boilers.

for all local residents, to start things off. As fast as men were paired and native carriers secured, we sent them out into the bush in various directions. Each two-man party had a general route prescribed in advance, but it was subject to variation as work progressed and as native information was secured. The only definite objective we had to shoot for at that time was the Kipushi (now Prince Leopold) mine that the Belgians were starting to investigate southwest of Elisabethville and close to the Rhodesian boundary. In fact we were not sure until we made an instrument survey that it was not within our concession. The Belgians must have been doubtful too, because great secrecy was preserved. We each set up small camps on our respective sides of the supposed international line and spied on each other's workings at night. We found a small deposit of placer gold near by, but none of the Kipushi ore crossed the line.

The various prospecting parties reported to headquarters every week or every two weeks, depending on their distance from the base camp. Each party used selected boys as messengers, and we gave them khaki uniforms with R.C.B.C. on the shirts. They were proud of the distinction. Two boys were generally used on long trips, because a native is fearful of traveling at night. These messengers were surprisingly dependable and swift, some of them covering 100 to 250 miles each way. We could almost tell to the hour when messengers would arrive, and we never lost a report or a sample through native disobedience or neglect. One messenger was taken at night by a lion when he insisted on sleeping outside of a hut in a small native village, and one prospector shot up his kitchen equipment from his tent one night when trying to kill a lion that got into the detached hut to get his cookboy. Crocodiles were plentiful in all of the rivers, but they took only one native carrier who stood in the edge of a stream to wash his legs.

Exploring vs. Development

The organizations for exploration work in the concession and for mine development at N'Changa were kept more or less separate, although the mine staff served the field work as much as possible, the manager, Aubrey Tennant, acting as assistant manager for R.C.B.C. in my absences. A small engineering staff was kept at the N'Changa headquarters, and the men on that staff made the maps of the concession as the traverses and reports came in from the field. For the first two years, I inspected every discovery that appeared to have promise and decided whether it warranted trenching or other development. The rainy season was very regular, starting about Oct. 15 and continuing until April, and, though the rainfall was not over 60 in., prospecting and motor travel became increasingly difficult. We put the prospectors on development at predetermined places at the end of each dry season and the engineers were often brought into headquarters to work on maps. From time to time we changed the parties to prevent staleness and friction, and, as a rule, the parties saw no other white men while they were out. When two parties met, it was usually by arrangement.

As nearly as possible the European food supplies were sent out by carriers once a month, and later, as roads were built, by lorry to points that could be reached by their own boys. Their messengers carried back mail, magazines, tobacco, and generally a couple of bottles of whisky. We paid the prospectors and engineers all £40 a month plus equipment and food while in the field. They were dependent on the game they killed for meat for themselves and their boys and were usually able to buy enough native grain and vegetables for their crew. Each party had a medicine case, iodine, quinine, and castor oil being the standbys in treating natives, the power of suggestion often working wonders.

Solicitude for Natives

British authorities are very strict with regard to the hiring and treatment of natives. They work under a contract called a "ticket," which

is usually for a definite length of time, and for a fixed minimum wage, plus food. A boy can lodge a complaint against his boss in the nearest government "Boma," and it goes badly with any white man who has abused him physically or who has not paid him. Many old-time Europeans think the government coddles natives too much for their own good. Sometimes the punishment of natives is inadequate and that of Europeans too severe. The magistrate or native commissioner in his annual tax-gathering rounds tries minor cases in the bush, but when charges are serious all parties and witnesses are summoned to the government Boma for trial of the case.

The government also prescribes a schedule of rations for all employed natives, and companies have to provide everything therein if at all possible. It includes fixed quantities of meal, green vegetables, meat, beans, peanuts, and salt. Salt and sugar are prizes, as are cigarettes and tobacco. Sometimes, as happened once or twice with us, there is a great scarcity of native foods in an area and it becomes a serious problem to transport from the railway all that is required. At permament camps cattle must be provided for meat, and these live only a short time in that tse-tse fly country. Altogether, a manager's life is something besides looking at maps and signing checks.

We had no doctor at N'Changa for three years (although there was a government doctor at N'dola, 92 miles away) because we could not find one in Africa who would come to the bush, and the London office could not get any to come out. We had three European deaths at N'Changa before we finally got a young doctor from England.

Starting with a crew of three men, including myself, in May, 1923, the R.C.B.C. personnel numbered 150 whites and 3,000 natives by 1926.

Transport Difficulties

Diamond and shot drills were steam-driven, the fuel being local wood, cut on contract, and fired in portable boilers. When compressors, hoists, and generators were finally required, these also were steam-driven. By 1927 we had bought practically every light steam boiler that could be found in the Union and Southern Rhodesia, and the transport problem involved in getting them to N'Changa and Lunsemfwa in the rains was a real one. Oxen were used whenever possible for transport, but the number of animals brought in from the south had to balance food requirements, because they would all be fly-struck and die within three or four months if not butchered for meat at an early stage of the sickness.

One difficulty with heavy motor transport was the cost of surfaced and drained roads. Rock outcrops were scarce, and laterite had to be found and used for surfacing. Corduroy was often utilized in boggy places but was bad for motor vehicles. Gasoline cost over 4s. per Imperial gallon.

An illustration of early transport difficulties was hauling the first drill to N'Changa. The only one available was a heavy shot drill 92 miles away at N'dola. It weighed, with boiler, 5 tons. We had cut a road from N'dola to N'Kana, but the Kafue River had to be crossed and the rest of the route for 55 miles was virgin bush. A contract was let to an English engineer named Williams, who was in the country, and it took him 26 days with 128 boys to pull it to N'Changa.

Boundary Question

That trip came near to costing the Congo Border company an important part of the N'Changa mine through a discrepancy that Williams observed between the description and the map of the N'Kana concession which had just been sold by the Congo Border group to the Bwana M'Kubwa company.

When the N'Kana concession was granted in London the year before, the area had been loosely described with reference to points shown on an inaccurate map of the region. The head of a small stream mentioned as a point on the western boundary was passed by Williams on that trip, and on arrival at N'Changa his surveying experience led him to conclude that the west boundary of the N'Kana Concession would cross the N'Changa deposit instead of being 4 miles to the east as this map showed it.

The information reached George Broadbridge, manager of Bwana M'Kubwa, first, and he immediately cabled Sir Edmund Davis, chairman of his company in London, who promptly instructed Broadbridge to survey the questioned boundary. At that early date, R.C.B.C. did not possess even a theodolite, but we made a quick compass survey of the line, which confirmed the error, and we were able to cable our board the facts before Davis got them. Two well-known English boundary experts were employed in London to represent the two companies, and R.C.B.C. won the decision. This, and the question as to the location of the Kipushi mine, previously described, were the only two serious boundary threats that arose, although three other mineral discoveries were found exactly on boundaries of the concession.

One of them was the discovery of placer gold by one of our prospectors in the Lunsemfwa River, which was then the eastern boundary of the Congo Border concession. I happened to be inspecting his work, 200 miles southeast of N'Changa, the day the discovery was made, and so was able to cable London immediately, recommending an extension of our rights to the east, and this application was granted. The gold occurrence proved very limited, but the important Lunsemfwa copper ore lenses were found soon afterwards a short distance within the new area.

A Loyal Staff

Many incidents and facts could be told to elaborate the story of this highly successful mining exploration company, but relation of them would make it too long for present purposes. Two or three things remain to be mentioned that had a great bearing on its success. One was the intense company loyalty of the employees and their determination to make the undertaking successful. The presence of wives and woman employees at the principal camps entailed additional responsibilities because of the question of health, but they proved to be a most helpful influence.

In my own experience, I feel sure that a good deal of the comradery and spirit that exist in the Rhodesian copper field today was brought there by my wife, who was the first woman to see and live at N'Kana and the first to see and live at N'Changa. No story of that pioneer period would be complete without paying tribute to her for the spirit she helped to bring to our undertaking, and that she carried to her death in Bulawayo in 1925, without once complaining or expressing a wish that she were somewhere else.

The name N'Changa is really a contraction of Nama Changa, meaning "the Mother of Changa," and so expresses in a sense the fact that it is also the mother of the other great copper mines of Rhodesia.

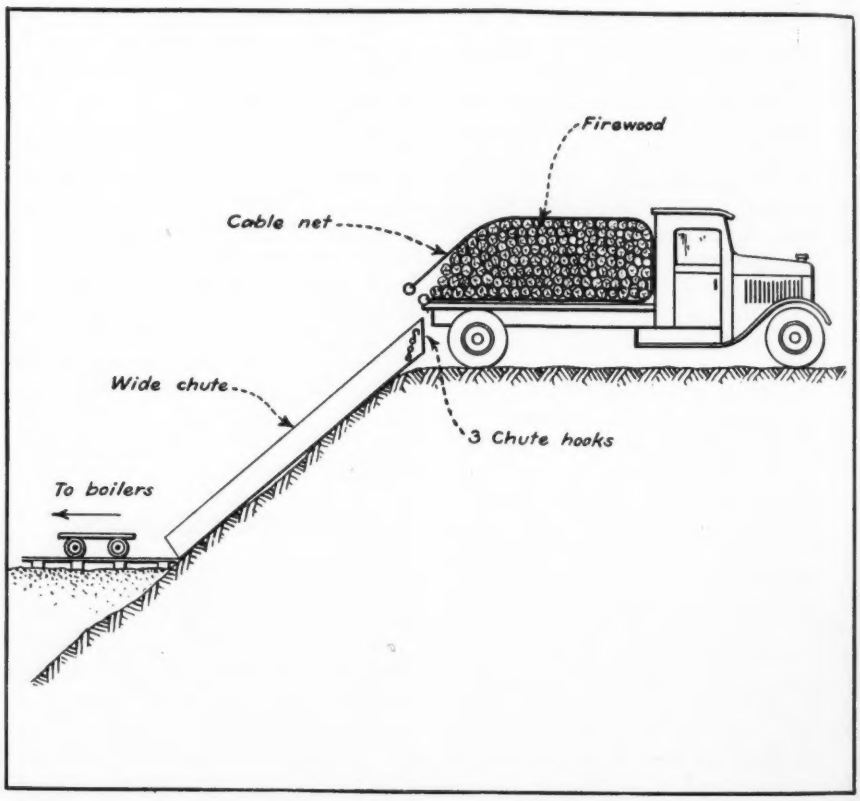
This account is confined almost entirely to the period of explorations with which I was personally familiar and of which I was in charge. Later developments had best be told by others who were there and who were responsible for them.

OPERATING IDEAS

Cordwood-Laden Trucks Unloaded Easily

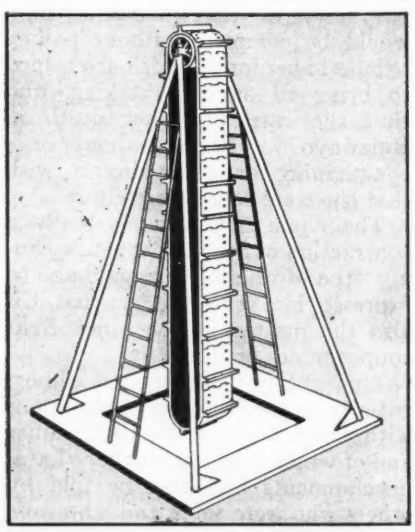
MANY MINING OPERATIONS in the mountains of western Chihuahua depend on steam power, according to Manuel Lopez C., of Chihuahua, Chih., Mexico, and because firewood is both cheap and plentiful, it is quite often used as fuel. The wood is bought on contract by the cord, cut to an average length of 2½ ft. and placed alongside the timber road where the platform trucks pick it up.

"We lost much time in unloading these trucks by hand," reports Mr. Lopez, "so we devised a net of old ⅝-in. mine cable to do the job. It consisted of three main cables and several cross pieces, the main cables being long enough to pass completely around the load as shown in the sketch. Attached to the far end of the truck platform, the net is draped up over the cab while the truck is being loaded, then is brought back over the load and fastened to the chassis. When the truck reaches the unloading chute, the top cables of the net are fastened to hooks at the top of the chute. The truck is then started in low gear forward and the wood is unloaded."



Stand for Tractor Grouser Welding

WITH A FLEET of 15 tractors to keep in operation, Oliver Iron Mining Co., Virginia, Minn., is constantly on the lookout for time-saving methods of repair and maintenance. Shown in the accompanying sketch is an arc-welded stand which is used in the company's shop to simplify the replacement of worn grousers with new applicator bars.



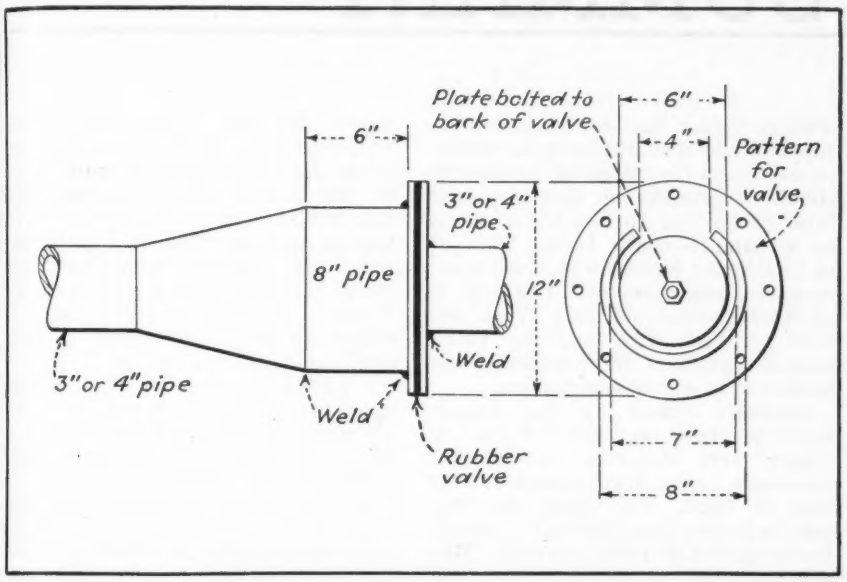
The track is placed on the stand and removed with the aid of a crane, and four bolts hold the track in place on the stand. Turning the sprocket places each grouser in the most convenient place for welding. The stand was built of scrap material in 2½ days at a total cost, including electrodes and power, of $22.25.

The applicator bars used by Oliver are of manganese steel that comes in 12-ft. lengths. Three such bars completely repair a worn track. Cut to length, each bar is tack-welded to the track, then one bead is run with $\frac{5}{32}$-in. stainless steel rod, and on the second bead, $\frac{3}{16}$-in. or ¼-in. stainless is used. This item, contributed by Conrad D. Krantz, won an award in a contest run by Hobart Brothers Co., Troy, Ohio, makers of arc welding equipment.

CORRECTION

A typographical error on page 97 of the June, 1944, *E. & M. J.* led to an incorrect statement of the source of the description of the open-top flame-cutting table. The item was contributed by Hobart Brothers Co., Troy, Ohio.

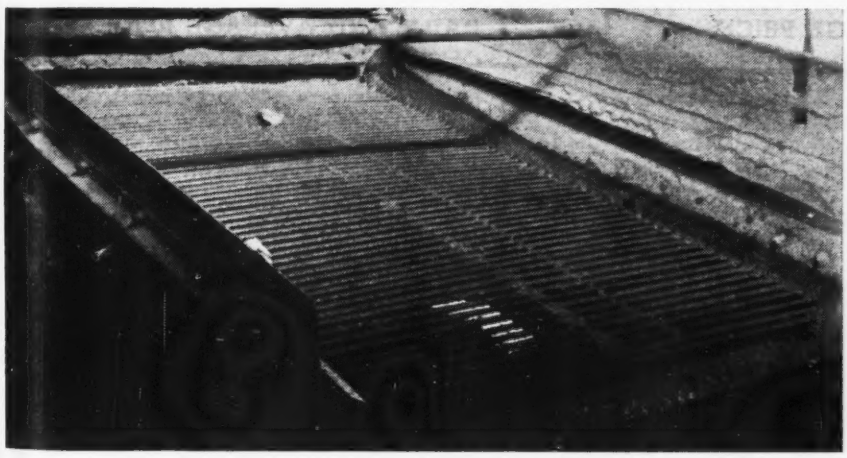
Simple Check Valve Built for Slimes Pipeline



A CHECK VALVE that can be built from scrap materials is described by William Tinto, plant mechanic, Mountain Copper Co., Ltd., Matheson, Calif. The elements of the valve are shown in the accompanying sketch, including a pattern of the valve disk, which is cut out of ½ × 12-in. chute rubber. The valve box is made out of an 8-in. pipe nipple, 6 in. long, and the tapered end is made out of a long 3- or 4-in. pipe nipple split for 12 in., with the segments then spread to fit the 8-in. pipe. The V openings are filled with plate.

Two flanges are cut from ½-in. plate, both 12 in. in diameter, but one of them cut out to fit the outside diameter of the 8-in. pipe and the other cut to fit over the end of the 3- or 4-in. pipe, whichever is used in the line. The flanges should be drilled for eight ½-in. bolts in the pattern shown for the valve disk.

Improvised Screen Stands Up Well

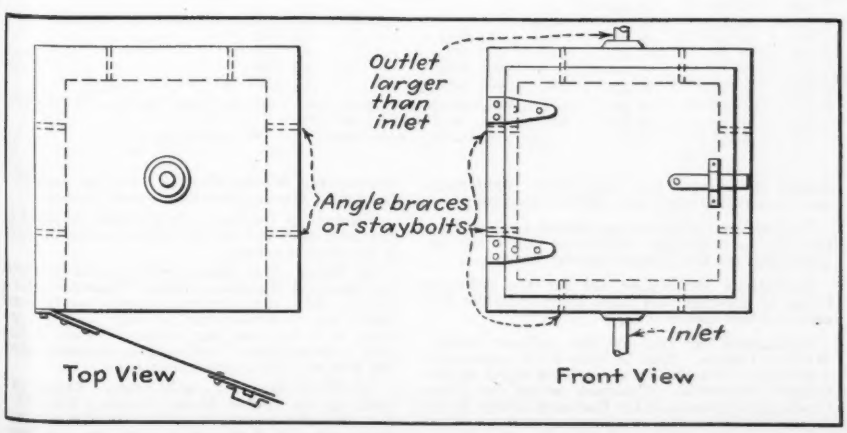


UNABLE TO OBTAIN a replacement deck for a No. 2 Tyler Niagara, 4 × 6-ft. screen, W. A. Vickers, master mechanic for Neptune Gold Mining Co., Bonanza, Nicaragua, built the deck shown in the accompanying photograph. He reports that the old screens had been welded and patched until they could be used no longer.

The screen shown was made of ½-in. round iron, the lightest stock available, spaced ¾ in. apart, and, according to Mr. Vickers, this improvised screen has stood up extremely well and has proved particularly good for screening muddy ore.

After the photograph was taken, he notes, the center bar was put back on the screen.

Ice Box Substitute Keeps Food Cool



JOHN BROATCH, master mechanic for Bayonne Consolidated Mines, Ltd., Bayonne, B. C., suggests a cooler for mine homes suitable for use in mining camps were cold water is available and ice, or electric refrigeration, is not. If the cold water can be allowed to run to waste, the box can be built out of light sheet iron as shown in the accompanying sketch, and only a small amount of water is necessary to provide ample cooling, he says, for milk and vegetables. If the water cannot be wasted, the box can be connected right into the cold-water line into the house, but it must then be made of heavier metal in order to withstand the pressure.

MARKET SUMMARY

CONSUMPTION OF MAJOR non-ferrous metals during June continued at a high level. Production, based on preliminary returns from mining areas, probably declined as a result of growing manpower shortages. With the exception of quicksilver, the price structure presented no problem. The *E.&M.J.* index of major non-ferrous metal prices continued at 88.74 in June for the 22d consecutive month.

Quicksilver sold in larger volume, but at steadily reduced prices. As June ended, quicksilver was offered in New York at $98 per flask, prompt shipment, with forward metal wholly nominal and the price subject to negotiation. Producers have become discouraged over the inability of the trade to absorb more metal and thereby stabilize prices. Though output has been curtailed, the supply of metal overhanging the market proved to be too large to reverse the trend. Consumers felt that they have little or nothing to lose by operating on a hand-to-mouth basis. The job of liquidating high-cost mercurials has been a market factor. The top in quicksilver prices in New York was $208 per flask, late in 1941. Under normal conditions, $80 per flask would be viewed as a satisfactory price.

Statistics issued by the Copper Institute show that 165,714 tons of copper were delivered to domestic customers during May, against 155,877 tons in April. The figure for May was the largest monthly total on record. In the opinion of trade authorities, May will probably go down as the peak month for the entire war period. Deliveries for both June and July will be smaller. Production of crude copper in the United States during May amounted to 94,078 tons, against 92,779 tons in April, and 105,227 tons in May last year. Imports have been substantial, largely from Chile, Peru, and Mexico. Africa has been shipping more copper to the United States. World production of copper in 1943 was 3,070,557 tons, according to an estimate appearing in the latest edition of the Yearbook of the American Bureau of Metal Statistics. This compares with 2,402,475 tons in 1939.

Interest in lead during the last month centered in developments in Mexico in connection with the strike of miners at the principal mining properties.

Major Metals

U.S. DAILY AND AVERAGE PRICES

1944	Electrolytic Copper		Straits Tin	Lead		Zinc
	Domestic	Export	New	New		
June	(a) Refinery	(b) Refinery	York	York	St. Louis	St. Louis
1	11.775	11.700	52.000	6.50	6.35	8.25
2	11.775	11.700	52.000	6.50	6.35	8.25
3	11.775	11.700	52.000	6.50	6.35	8.25
5	11.775	11.700	52.000	6.50	6.35	8.25
6	11.775	11.700	52.000	6.50	6.35	8.25
7	11.775	11.700	52.000	6.50	6.35	8.25
8	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
10	11.775	11.700	52.000	6.50	6.35	8.25
12	11.775	11.700	52.000	6.50	6.35	8.25
13	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
15	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
17	11.775	11.700	52.000	6.50	6.35	8.25
19	11.775	11.700	52.000	6.50	6.35	8.25
20	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
22	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
24	11.775	11.700	52.000	6.50	6.35	8.25
26	11.775	11.700	52.000	6.50	6.35	8.25
27	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25
29	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25
		AVERAGES FOR MONTH				
June	11.775	11.700	52.000	6.50	6.35	8.25
		AVERAGES FOR WEEK				
June						
7	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25
		CALENDAR WEEK AVERAGES				
June						
3	11.775	11.700	52.000	6.50	6.35	8.25
10	11.775	11.700	52.000	6.50	6.35	8.25
17	11.775	11.700	52.000	6.50	6.35	8.25
24	11.775	11.700	52.000	6.50	6.35	8.25

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(*a*) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.225c. per pound, the average differential for freight and delivery charges.

(*b*) Export prices are net at refineries on the Atlantic seaboard and include sales of domestic copper in the foreign market. Owing to the World War and the disruption of normal trade relations, our export copper quotations, since September, 1939, have been based largely on f.a.s. transactions, ex United States ports. We deduct .05c. from the f.a.s. basis (lighterage, etc.) to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month.

Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

1944	Sterling Exchange		Silver		Gold	
	"Checks"	"90-day	(c)			(d) United
June	(Nominal)	demand"	New York	London	London	States
1	401.000	(f)	44.750	23.500	168s	$35.00
2	401.000	(f)	44.750	23.500	168s	35.00
3	401.000	(f)	(e)	(e)	(e)	35.00
5	401.000	(f)	44.750	23.500	168s	35.00
6	401.000	(f)	44.750	23.500	168s	35.00
7	401.000	(f)	44.750	23.500	168s	35.00
8	401.000	(f)	44.750	23.500	168s	35.00
9	401.000	(f)	44.750	23.500	168s	35.00
10	401.000	(f)	(e)	(e)	(e)	35.00
12	401.000	(f)	44.750	23.500	168s	35.00
13	401.000	(f)	44.750	23.500	168s	35.00
14	401.000	(f)	44.750	23.500	168s	35.00
15	401.000	(f)	44.750	23.500	168s	35.00
16	401.000	(f)	44.750	23.500	168s	35.00
17	401.000	(f)	(e)	(e)	(e)	35.00
19	401.000	(f)	44.750	23.500	168s	35.00
20	401.000	(f)	44.750	23.500	168s	35.00
21	401.000	(f)	44.750	23.500	168s	35.00
22	401.000	(f)	44.750	23.500	168s	35.00
23	401.000	(f)	44.750	23.500	168s	35.00
24	401.000	(f)	(e)	(e)	(e)	35.00
26	401.000	(f)	44.750	23.500	168s	35.00
27	401.000	(f)	44.750	23.500	168s	35.00
28	401.000	(f)	44.750	23.500	168s	35.00
29	401.000	(f)	44.750	23.500	168s	35.00
30	401.000	(f)	44.750	23.500	168s	35.00
			AVERAGES FOR MONTH			
June	401.000	.....	44.750	23.500	....	35.00
			AVERAGES FOR WEEK			
June						
7	401.000	.....	44.750			
14	401.000	.....	44.750			
21	401.000	.....	44.750			
28	401.000	.....	44.750			

Calendar week averages, New York Silver: June 3rd, 44.750; 10th, 44.750; 7th, 44.750; 24th 44.750.

(*e*) Not quoted (Saturday). (*f*) No quotation.

(*c*) Silver other than newly-minded domestic, by Handy & Harman. Under Treasury order of July 6, 1939, the price on domestic newly-mined silver mined subsequent to July 1, 1939, was fixed at 71.11c. per troy ounce. Handy & Harman's quotations on newly-mined domestic silver, 999 fine was 70⅝c. throughout June.

(*d*) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

As June ended the interruption in production in Mexico caused the Tin-Lead Division of WPB to release common lead of foreign origin on a restricted basis to conserve the supply of that grade. The emergency stockpile of lead is fairly large, but consists chiefly of corroding lead. Demand for lead over the third quarter of the year is expected to remain high, averaging between 60,000 and 65,000 tons a month.

Zinc supplies are ample, and consumers purchased metal against actual nearby needs only, which made for a rather quiet market. Stocks of zinc in the hands of producers at the end of May totaled 218,122 tons, against 111,015 tons in May last year.

Recognition of the Bolivian Government by the United States was announced late in June. This action is not expected to greatly influence the tin situation in that country. Producers claim that higher prices are necessary to increase output of tin concentrates.

Primary output of aluminum in the United States during March was 160,400,000 lb., against 148,800,000 lb. in February.

Miscellaneous Metals Monthly Averages

Average prices of miscellaneous metals for May and June.

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations, (e) Special shapes sold to platers.

	May	June
Quicksilver, N. Y. flask	115.538	101.692
Antimony (a)	15.839	15.839
Antimony, bulk, Laredo	14.500	14.500
Antimony, bulk, N. Y.	15.265	15.265
Antimony, Chinese (b)	16.500	16.500
Platinum, oz. troy	35,000	35,000
Cadmium (c)	90.000	90.000
Cadmium (d)	92.500	92.500
Cadmium (e)	95.000	95.000
Aluminum ingot	15.000	15.000

E & M J Price Index

Weighted index of non-ferrous metal prices (copper, lead, zinc, tin, silver, nickel, and aluminum). The average for the years 1922–1923–1924 equals 100.

1929	110.33	1936	73.45
1930	82.87	1937	90.86
1931	60.20	1938	73.67
1932	48.26	1939	77.71
1933	59.79	1940	79.22
1934	69.59	1941	83.49
1935	74.66	1942	86.80
	1943	88.74	

	1942	1943	1944
January	85.39	88.74	88.74
February	85.90	88.74	88.74
March	85.90	88.74	88.74
April	85.90	88.74	88.74
May	85.90	88.74	88.74
June	85.90	88.74	88.74
July	85.90	88.74	....
August	85.90	88.74	....
September	88.74	88.74	....
October	88.74	88.74	....
November	88.74	88.74	....
December	88.74	88.74	....

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated

(July 1, 1944)

MISCELLANEOUS METALS

Aluminum, ingot, 99 plus per cent, lb. — 15c.
Antimony, domestic, spot, lb. 5 tons or more — 15.839c.
Bismuth, ton lots, lb. — $1.25
Cadmium, commercial sticks, lb. — 90c.
Calcium, lb., ton lots, 97 @ 98 per cent — $1.25
Chromium, 97 per cent grade, lb. — 89c.
Cobalt, 97 to 99 per cent, per lb. — $1.50
Indium, troy oz. — $7.50@$8.50
Nickel, electrolytic cathodes, lb. — 35c.
Magnesium, 99.8 per cent, carloads, lb. — 20½c.
Palladium, troy oz. — $24.00
Platinum, (Official quotation) troy oz. — $35.00
Quicksilver, flask of 76lb., 100 flasks or more — $98.00
Selenium, 99.5 per cent, lb. — $1.75
Silicon, minimum 97 per cent, spot, carloads, lb. — 14.75c.
Tellurium, lb. — $1.75
Thallium, 100 lb. or more, lb. — $12.50 nom.
Titanium, 96 to 98 per cent, lb. — $5.00

METALLIC ORES

Beryllium Ore, 8 to 12% BeO, f.o.b. mine, per unit — $14.50
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry, 48% Cr_2O_3, 2.8 to 1 ratio — $41.00
48% Cr_2O_3 3 to 1 ratio — $43.50
Iron Ore, Lake Superior, Lower Lake ports, long ton:
Old Range bessemer — $4.75
Mesabi bessemer — $4.60
Old Range non-bessemer — $4.60
Mesabi, non-bessemer — $4.45
Lead (Galena) 80 per cent, Joplin, Mo., ton — $76.01
Manganese, Metals Reserve Co. sales price, per long-ton unit of Mn contained, 48 per cent, subject to premiums and penalties, effective May 15, 1944: 85c. (duty paid) New York, Philadelphia, Baltimore, Norfolk, Mobile, and New Orleans; 91c., Fontana, Calif., Provo, Utah, and Pueblo, Colo.
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines — 45c.
Tungsten Ore, per unit of WO_3:
Chinese, 60 per cent, duty paid — $24.00
Domestic, 60 per cent and upward — (a) $25.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines — 27½c.
Zinc Ore, Prime, 60 per cent concentrate, Joplin, Mo.; per ton — $55.28
(a) Prices at mines, small lots, usually several dollars less.

METALLIC COMPOUNDS

Arsenious Oxide (arsenic) lb. — 4c.
Cobalt Oxide, 70 @ 71 per cent, lb. — $1.84
Copper Sulphate, 100 lb. — $5.00

ALLOYS

Beryllium Copper, 2.5 to 3 per cent Be, per lb. of contained Be — $15.00
Ferrochrome, 65 @ 70 per cent per pound of Cr contained. — 13c.
Ferromanganese, 78 @ 82 per cent, gross ton — $135.00
Ferromolybdenum 55 @ 65 per cent Mo. lb. of Mo. contained — 95c.
Ferrosilicon, 50 per cent, per lb. of contained Si. — 6.65@8.10c.
Ferrotungsten, 75 @ 80 per cent, lb. of W contained — $1.90
Ferrovanadium, per lb. of V, delivered — $2.70@$2.90
Silicomanganese, 1 per cent C, gross ton — $133.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canadian (Quebec) mines (U. S. funds), ton:
Crude No. 1 — $650@$758
Crude No. 2 — $165@$385
Spinning fibers — $124@$233
Paper stock — $44@$49.50
Shorts — $14.50@$26.50
Vermont, f.o.b. Hyde Park:
Shingle stock — $62.50@$65.00
Paper stock — $44.00@$53.00
Shorts — $14.50@$28.50
Floats — $19.50
Barytes, long ton:
Georgia, crude — $8.50@$9.00
Missouri, 93 per cent $BaSO_4$, less than 1 per cent iron — $6.75@$7.25
Bauxite, long ton:
Domestic, crude, 50 @ 52 per cent (not dried) — $5.00
Domestic, chemical, 55 @ 58 per cent — $7.50@$8.50
Domestic, abrasive, 80 @ 84 per cent — $16.00
China Clay, f.o.b. mines, ton:
South Carolina and Georgia, No. 1, bulk — $6.75@$8.00
Delaware, No. 1 — $15.00
Feldspar, bulk, ton:
Potash feldspar, 200 mesh — $17.00
Glass-spar, white, 20 mesh — $11.75
Fluorspar, f. o. b. mines, bulk, Kentucky and Illinois 85–5 per cent, all rail movement, ton — $33.00
Acid 98 and 1 per cent, bulk, ton — $37.00
Fuller's earth, F.o.b. Georgia or Florida, ton — $7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington — $22.00
Mica—The Colonial Mica Co., agent for Metals Reserve Co., on recommendation of WPB, extended its arrangement to purchase domestic strategic sheet mica at $6 a pound up to Dec. 31, 1944. This applies to No. 1 and No. 2 qualities, sizes 1 x 1 in. and larger full trim, and sizes 1½ x 2 in. and larger three-quarter trim.
Ocher, Georgia, ton — $19.00@$22.00
Pyrites, Spanish, per long ton unit of S, c i f. Atlantic ports — 12c., nom.
Silica, in bags, 325 mesh, ton — $20.00@$40.00
Sulphur, Texas, mines, long ton — $16.00
Talc, f.o.b. works, ton:
New York, double air-floated, 325 mesh — $12.00@$15.00
Vermont, extra white, 200 mesh — $9.50@$10.50
Tripoli, Missouri, ton:
40 mesh, cream colored — $14.50
200 mesh, cream colored — $26.00

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic — $23.50
Steel, base price, Pittsburgh Billets, gross ton — $34.00
Structural shapes, 100 lb — $2.10

WASHINGTON REFLECTIONS

McGRAW-HILL WASHINGTON NEWS BUREAU

Committee Reorganization May Hasten Mining Bills

Probably the recent organization of the House Committee on Mines and Mining into four subcommittees will do much to further prompt legislative action on mining matters. As the organization now stands, there is a chairman at the head of each subcommittee, who has a vital interest in the subjects coming before his group.

The subcommittees and members are as follows, the first named member being chairman in each case:

Non-Ferrous Metals and Minerals: Democrats: John R. Murdock, Arizona; Compton I. White, Idaho; Clair Engle, California. Republicans: Robert F. Rockwell, Colorado; Harris Ellsworth, Oregon.

Phosphate, Potash, and Other Non-Metallic Minerals. Democrats: J. Hardin Peterson, Florida; Compton I. White, Idaho; Antonio M. Fernandez, New Mexico. Republicans: Fred. Bradley, Michigan; Walter E. Brehm, Ohio.

Precious Metals and Minerals: Democrats: Clair Engle, California; Compton I. White, Idaho; John R. Murdock, Arizona. Republicans: Robert F. Rockwell, Colorado; Harris Ellsworth, Oregon.

Coal: Democrats: Jennings Randolph, West Virginia; Augustine B. Kelley, Pennsylvania; John R. Murdock, Arizona. Republicans: Gerald W. Landis, Indiana; C. W. Bishop, Illinois.

Advantage was taken of this new set-up by Congressman Engle when he introduced a bill "To provide for relief of owners of mines required to suspend operations by reason of restrictions arising from the war effort; and for suspending of certain obligations against the operators of mines who are forced to cease operations because of the war." This bill, H.R.5093, contains a proposed amendment to the Reconstruction Finance Corporation Act which resulted in its being referred to the Committee on Banking and Currency. A new bill was introduced the following day. This bill contained only that portion of the previous measure that should rightly come before the Committee on Mines and Mining, to which it was promptly referred. There, Mr. Engle, as chairman of the subcommittee on Precious Metals and Minerals, will be able to give the legislation a good start. It is possible that the bill will be rewritten in the committee to include the portions amending the RFC Act which caused the previous bill to be referred to the Committee on Banking and Currency.

Congressman Engle introduced a third piece of legislation just before Congress recessed, which would amend Section 14, of the RFC Act to raise the appropriation for mine loans from $10,000,000 to $25,000,000. It would also abolish discrimination between types of loans. The bill, if passed, would instruct RFC to receive and act on applications for loans from closed gold and silver mines so that they will be able to start rehabilitation measures as soon as restrictions are removed.

Although the new arrangement may expedite legislation, it is doubtful that the public interest is served by the sponsors of legislation being chairmen of the committees which study them in behalf of the houses of Congress.

Conference Planned on Postwar Mineral Control

According to the *New York Times*, the Administration is planning an international conference on postwar control of minerals. Prominently mentioned is Dr. C. K. Leith, who is the outstanding exponent of using mineral controls to prevent the belligerently inclined nations from acquiring the supplies necessary to carry on warfare.

The problem of control has two major aspects. One is the prevention of excess minerals going to warlike nations, as stated. Although there is little dispute over the desirability of such action, there is much difference of opinion over the means (*E&MJ*, March, p. 90; July, 1943, p. 93; and May, 1943, p. 88).

The other aspect pertains to the promise contained in Article Four of the Atlantic Charter to afford equal access for all nations to the trade and raw materials of the world. The vigor with which this feature is pressed will be an excellent clue to the sincerity with which that much-discussed, never clarified, and partly repudiated document was promulgated.

If, after Churchill's refusal to grant the hope of self-determination to subject peoples, and the Roosevelt statement over the preservation of national integrity, nothing substantial is done to make good on Article Four, the people of the world are likely to dismiss the Atlantic Charter as a mere campaign pledge.

Any international agreement affecting either aspect of the mineral control problem will probably affect the mining industry's future profoundly, both domestically and internationally.

The newspaper account stated that consideration would be given to petroleum, high-grade iron ore, copper, zinc, lead, bauxite, tin, mica, chrome, quartz crystals, and diamonds.

Slow Progress Made on Stockpiling Front

Although specific legislation covering mineral stockpiling continued to hang fire, two events affecting stockpiling occurred during last month.

About mid-June Senator Murray stated that he indorsed the principle of stockpiling military reserves of critical and strategic minerals, and promised to insert a clause to this effect in the surplus property disposal bill under consideration by Military Affairs subcommittee.

In Procurement Regulation No. 7, the War Department created a basis for prompt disposal of inventories left in government hands, but named a list of "stockpile items" which would be retained. The list includes: aluminum ingot, antimony, asbestos, bauxite, beryl, bismuth, cadmium, optical calcite, chromite, English chalk, English china clay, cobalt, columbite, copper, corundum, natural cryolite, industrial diamonds, emery, acid and metallurgical fluorspar, graphite, indium, Indian kyanite, lead, manganese, mercury, mica, molybdenum, monazite, nickel, platinum, quartz crystals, rutile, sapphire, selenium, strontium (celestite), talc, tantalite, tin, tungsten, vanadium, zinc, and zirconium.

Light Metals Face Reconversion Problems

Shutdown of numerous additional potlines for aluminum production, announced for June, has emphasized the urgency of some program for the disposal of government-owned plants and materials. Work on possible plans is under way in several government agencies. War Production Board would be glad to allocate aluminum for the manufacture of foil and other civilian products were it not that this would divert scarce labor from more essential war projects. The competitive situation between aluminum and other metals normally used in the manufacture of foil must also be considered.

The Department of Justice is deeply interested in this situation. Its antitrust division has been trying to figure out how the concentration of production in single companies can be reduced when Uncle Sam sells his surplus production facilities. There is obvious desire on the part of the "trust busters" to favor competitors of the Aluminum Co. of America and Dow Chemical Co.

Also potent are the political efforts of different regional groups, each of which

is seeking to secure government aid for postwar development in its particular region. However, none of these groups have yet discovered how to formulate a plan acceptable to Surplus Property Administrator Clayton for subsidizing high-cost production. The possibility exists that if companies were given the plants free and were exempted from taxes on the physical property, they still could not produce either aluminum or magnesium at competitive prices.

There is talk in Washington of removing aluminum from allocation in view of the ample supplies of that metal. Definite action is expected in mid-July. If this is done it may provide a pattern for the relaxation of controls over other metals. Such action would not ease the limitations on the uses to which aluminum could be put. All it would do would be to permit fabricators that are permitted to use the light metal to buy it wherever possible in the open market instead of having all production channeled to the ultimate user as at present.

Contract Settlement Act Is Now a Law

The Contract Settlement Act legalizing negotiated settlements of canceled war orders was signed by the President on July 1. Although the Act provides machinery for the quick settlement of claims, the wording of Section 17 seems likely to encourage a vast number of claims of doubtful validity.

As the act was passed the War Production Board was included in the list of "contracting agencies" along with the Reconstruction Finance Corporation and its subsidiaries. The law also defines defective, informal and quasi contracts as follows:

"Sec. 17 (a) Where any person has arranged to furnish or furnished to a contracting agency or to a war contractor any materials, services, or facilities related to the war, without a formal contract, relying in good faith upon the apparent authority of an officer or agent of a contracting agency, written or oral instructions, or any other request to proceed from a contracting agency, the contracting agency shall pay such person fair compensation therefor.

"(b) Whenever any formal or technical defect or omission in any prime contract, or in any grant of authority to an officer or agent of a contracting agency who ordered any materials, services, and facilities might invalidate the contract or commitment, the contracting agency (1) shall not take advantage of such defect or omission; (2) shall amend, confirm, or ratify such contract or commitment without consideration in order to cure such defect or omission; and (3) shall make a fair settlement of any obligation thereby created or incurred by such agency, whether expressed or implied, in fact or in law, or in the nature of an implied or quasi contract."

(*Continued on page* 136)

A. H. Bunker

Harris & Ewing

Philip D. Wilson

Howard I. Young

Sixfold Shuffle of WPB Mineral Personnel

Announcement has been made of the appointment of a new War Production Board vice chairman for Metals and Minerals and other organizational shifts of interest to the mining industry.

The new director of mineral policies and activities of WPB is Philip D. Wilson, who has recently been director of the Aluminum-Magnesium Division of WPB. He succeeds Arthur H. Bunker, who was appointed vice chairman for metals and minerals when this office was created in January.

Many years of experience in mining have qualified Mr. Wilson for the important responsibility he now bears. He is a native of Chicago, and a graduate of Princeton and the Columbia University School of Mines. He was engaged in the copper industry in Arizona from 1911 to 1924, with the Phelps Dodge Corporation and the Calumet & Arizona Mining Company. Later, he joined the American Metal Company, Ltd., working in North and South America, Europe and South Africa in the exploration, development and management of mining properties. At the time he joined the Office of Production Management, WPB's predecessor, Mr. Wilson was vice chairman of Pardners Mines Corporation, New York, N.Y., with interests in many parts of the world.

Mr. Bunker's vacation of the metals and minerals vice chairmanship is due to his advancement to the post of deputy executive vice chairman of WPB, in which capacity he is also vice chairman of the important Production Executive Committee. In this position it is expected that he will be in charge of cut-backs, and will succeed Charles E. Wilson as executive vice chairman.

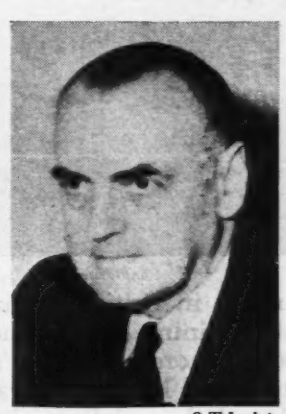
Announcement is also made of the resignation of Howard I. Young, well-known mining executive, as deputy vice chairman for Metals and Minerals. Mr. Young will resume full-time control of the American Zinc, Lead & Smelting Co., of which he is president. The return of Messrs. Wilson and Young to private business is conditioned by the circumstances that the urgent production programs which they came to Washington to assist have been substantially accomplished, and their talents are required to direct the adaptation of their companies to postwar conditions.

James Douglas, who was director of the Zinc Division, succeeds Howard Young as deputy vice chairman for Metals and Minerals. The vacancy left by Mr. Douglas has been filled by consolidating the zinc and tin-lead divisions under Erwin Vogelsang, who has been director of the Tin-Lead Division.

Succeeding Philip Wilson as director of the Aluminum and Magnesium Division is George Heikes, who for three years served in the Zinc Division of WPB and its predecessor agencies. Mr. Heikes is returning to government service from his present post with the Olin Corporation, Tacoma, Wash.

Harris & Ewing

James Douglas



O.W.I. photo

Erwin Vogelsang

Geo. C. Heikes

NEWS OF THE INDUSTRY

MMSW to Formulate Uniform Wage Policies

A uniform policy for collective bargaining and for dealings with government agencies has been formulated by the Manpower and Wage Stabilization Committee of the Mine, Mill & Smelter Workers Union, according to an announcement in the union's official publication. Ralph H. Rasmussen, union vice-president, is chairman of the committee. Essentials of the policy, subject to approval by local unions, are as follows:

The brass fabricating, die casting, and iron ore mining sections of the MMSW will continue to adopt wage policies taken, in whole or in part, from the United Steel Workers union (CIO). In the eleven Western states, the MMSW will seek "equalization and stabilization of wage rates within the industry," and a reasonable parity with wages in competing industries, such as construction, aircraft, and shipbuilding. Proposed rates range from a $7.75 per day minimum to $9.75 for miners and other skilled key men, with existing differentials for higher skills to be maintained.

Vacations with pay are asked; one week for one year's service and two weeks for two years or more. Vacation pay will include customary overtime for regular workers. For contract, or piece, workers, vacation pay will be the average wage during the four weeks preceding the vacation period or 2 percent of the employee's earnings during the preceding year, whichever is the greater.

Guaranteed annual wages will be sought by the union. This means that an employee's average hourly rate of earnings will be multiplied by 40, and in any week that his earnings fail to reach this sum, because of lack of employment, the company will be expected to make up the difference.

Sick leave will be asked, amounting to 15 days, at each employee's regular rate of pay, per year. Such sick leave is to be cumulative up to 90 days.

Premium pay, in all cases not covered by the pending decision on the 25c. per shift award, will be asked to the extent of 5c. per hour for the afternoon shift and 10c. per hour for the graveyard shift.

In the event that all or any part of the company's operations are closed down indefinitely, affected employees will ask four weeks' severance pay for less than three years' service and eight weeks' pay for more than three years.

All locals not already operating under incentive wage plans and binding arbitration clauses are asked to secure them.

It was suggested that all locals in the basic sections of the union attempt to obtain a common expiration date for their contracts, such date to be June 30, 1945, and that those unable to do so because of present agreements, work toward obtaining that date in 1946.

Uniform insurance plans are suggested, and leaves of absence for members entering the armed forces are to be asked. Benefits asked for such employees include 60 days' pay, based on the highest rate, including overtime, paid the man during the 30-day period prior to his leaving, and vacation pay each year that he is in the armed forces.

This program will be the subject of a pamphlet to be published by the MMSW.

Photo from Department of Mines and Resources, Ottawa

Pinchi Lake mercury mine, in British Columbia, located and developed by Consolidated Mining & Smelting Co. of Canada, Ltd., was closed recently because more than a year's supply of quicksilver is on hand. Production for 1943 was valued at $4,157,504. Upper photo shows glory hole and fault along which the ore was found; lower, the mine as seen from the lake.

Metals Reserve Cuts Purchases in Chile

Reduction of purchases of Chilean copper by the U. S. government is to take place as follows: On May 1, 1944, the price schedule for copper ores was reduced by 5 percent, with similar reductions occurring quarterly thereafter; on copper concentrate, the reduction will be 2½ percent quarterly. After Jan 30, 1945, buying of copper ores and concentrates in Chile will stop. This action applies only to copper purchase contracts between

Metals Reserve Co. and the government of Chile. Purchase of electrolytic, blister, or fire-refined copper from Chile Copper Co., Andes Copper, and Braden was not covered by these contracts and will continue as at present.

Nothing has yet been made public as to the future of the Chagres and the Naltagua copper smelters, which have been treating about two-thirds of the independent Chilean production under Metals Reserve supervision. During 1943 Metals Reserve bought in Chile copper ores and concentrates valued at $5,338,000, including the contained gold and silver. Tonnage bought was 55,600 metric tons of concentrate and 50,600 metric tons of ore.

After Aug. 1, 1944, no more Chilean gold ores or concentrates will be purchased by Metals Reserve, although these products have been much in demand because of their high silica content. During 1943, Metals Reserve bought 22,300 metric tons of gold ores and 19,000 tons of concentrates, the total valued at about $4,000,000, the larger part of which was reduced at the Chagres and the Naltagua smelters. It is expected that these siliceous gold ores will again be purchased by American Metal Co. and A.S.&R., as they were before Metals Reserve entered the picture.

With regard to manganese, an additional 40,000 tons of ore will be purchased, but that will be the end of Metals Reserve manganese buying in Chile. This tonnage will also have to be of higher grade, and penalties for impurities will be higher than in the past. These new regulations of Metals Reserve also reduce prices formerly paid for ores and concentrates of zinc, lead, molybdenum, cobalt, and tungsten, and for mercury. However, price cuts on these latter metals will have less effect on the country as a whole than will the cuts in copper, gold, and manganese.

USWA's Wage Demands Hit by Employees

An increase of 17c. per hour in wages of employees of iron-mining companies in the Lake Superior region would jeopardize the production of iron ore in the quantities now demanded for war purposes, Clarence J. Hartley, attorney for Oliver Iron Mining Co., declared recently before the special iron-ore panel of the War Labor Board. The panel has conducted hearings in Duluth on the iron-ore wage case of the United Steel Workers of America.

Earlier, Clarence B. Randall, vice president of Inland Steel Co., issued a statement in which he warned residents of the Michigan and Wisconsin iron ranges that the proposed wage increase would bear most heavily on the underground iron mines of that region. "No underground mine," he said, "could long survive under such a load. Only the open pits on the Mesabi would remain."

The wage increase demand was presented by the union some time ago in special hearings held in Washington. The union contended that the cost of living has risen more than was indicated by the Bureau of Labor Statistics' figures; more, in fact, than was provided for by the Little Steel formula. The 17c. increase was held to be necessary to balance increased living costs of the workers.

Aluminum and Steel Unions to Combine

The Aluminum Workers of America (CIO) voted unanimously on May 5 to amalgamate with the United Steel Workers of America (CIO). The occasion was the fifth biennial convention of the aluminum workers, organization held at the Arlington Hotel in Hot Springs, Ark.

N. A. Zonarich, president of the aluminum workers union, promised in his keynote address that the union would do its best to raise Southern wages to the level of those in the North. He said that aluminum workers are at present "opposed by minds limited to margins and profits." He prophesied that amalgamation with the steel workers union "would be the answer to all our problems."

The greatest challenge facing his union, Mr. Zonarich said, is prospect of organizing thousands of unorganized aluminum workers in Canada. They represent, he said, "a real threat to the improved standards of American aluminum workers."

Gold Rush Brewing At Yellowknife

Following close on the heels of the recent excellent gold discoveries at the property of Giant Yellowknife at Great Bear Lake, N.W.T., comes word of steadily increasing activity in this formerly quiet gold camp. Charles Camsell, deputy minister of the Department of Mines & Resources, Ottawa, recently described the Yellowknife area as "the hottest spot in the Northwest Territories."

First interest in Yellowknife was aroused in 1938, when high-grade gold ore was found in many small quartz veins on the shore of the lake, and a minor boom developed, but in recent years little attention has been given the area. For about the past year, Frobisher Exploration Co., a subsidiary of Ventures, Ltd., has been drilling the Giant Yellowknife property, and in March, 1944, it was announced that most promising ore had been struck in a shear zone which has been traced for about 1,200 ft., with an indicated width of about 35 ft. and an average value of about $20 per ton in gold.

Giant Yellowknife shares have about quadrupled in price on the Toronto Exchange, and many smaller Yellowknife claimholders were carried up in the rush. Reports are spreading that Giant Yellowknife may develop into a "big low-grade mine," with a capacity of anywhere from 1,000 to 10,000 tons. Consequently, the main interest in the area is now in wide shear zones rather than in the narrow quartz veins that once were eagerly sought. The town of Yellowknife is crowded with prospectors, and claims have been staked over a wide area from the site of the original discovery on Yellowknife Bay.

Aside from Giant Yellowknife, the principal mines of the district are the Negus, the Con mine of C.M.&S., the Ptarmigan, the Thompson-Lundmark, and the Ruth. Only the Negus has continued milling in the face of recent labor shortages.

Renewed Attention Paid North Carolina Talc

Renewed activity is noted in the search for and mining of white talc in Cherokee County, in western North Carolina, formerly a large producer of talc and the site of several mines that have been abandoned or flooded by the Hiawasee Dam of the TVA. Cherokee County lies along the Georgia state line, and the Georgia State Department of Mines, with the TVA, has just completed a joint survey in an effort to locate the talc, which lies in conjunction with the Murphy marble which occurs in both Georgia and North Carolina.

At present, three or four drill crews are prospecting the area between Andrews, N. C., and the Georgia border. Whitaker, Clark & Daniels, of New York, have opened a mine on property of the TVA about 5 miles below Murphy, N. C., and production began recently.

An operating shaft is being sunk by Tarheel Investment Co., Asheville, N. C., on land just south of Murphy, which it has been exploring. Ten miles away, at Marble, W. B. Hartsfield, of Atlanta, Ga., has drilled another area with good results. A shaft is also being sunk on this property. If successful, the talc produced from these mines will be of textile and ceramic grades.

India Gets U.S. Silver Under Lend-Lease

The U. S. government has agreed to supply 100,000,000 oz. of silver to the government of India under a special Lend-Lease agreement, according to a recent joint announcement of the Treasury Department and the Foreign Economic Administration. The metal

is to be used to supply adequate coinage for the United Nations' forces stationed in India and for the country's expanded war production.

The statement also said that the silver will be returned after the war, ounce for ounce, and that it is now supplied from the Treasury's stock of free silver. The shipment will not impair the supply of silver for domestic uses.

It was added that silver has already been supplied under Lend-Lease to a number of other countries for essential coinage and industrial uses. The total quantity of such silver shipped, to date, is approximately 4,000 short tons.

Senate Group Asks Curb on Mineral Imports

Among the conclusions and recommendations turned in recently by the subcommittee on mining and minerals of the Senate small-business committee was the suggestion that domestic mineral and metal production be given preferential treatment over imports. Cut-backs in domestic mine production, the committee believes, should be made only when the rate of consumption falls below the domestic output.

Other recommendations of the committee included suggestions for liberalization of various government activities affecting the small miner, such as: the premium-quota plan, Metals Reserve purchase contracts, RFC financing, access roads program, SEC regulations, freight rates, mine taxation, and the gold-mine closing order. James G. Scrugham, Senator from Nevada, is chairman of the subcommittee.

St. Joe President Sees Good Lead Future

With an adequate price, the major lead districts of the United States will continue to produce "for a long future," in the opinion of Clinton H. Crane, president of St. Joseph Lead Co., who spoke before the Mining Club of New York on June 14. He does believe, however, that domestic demand will exceed domestic supply, and that to obtain the necessary foreign lead, a price must be paid that is higher than that prevailing in prewar years.

Mr. Crane observed that the increase in production costs since the beginning of the war has been so great that even the only mines in this country that in 1943 were operating without bonus payments are now being forced to petition the WPB for help.

So far as stocks of lead are concerned, there is not a very great supply on hand, and Mr. Crane does not believe that there will return to the postwar market any such abnormal amount of battle scrap as appeared after the first World War. World prices of lead, he believes, must therefore rise to bring out the necessary supplies. He has confidence that some method will be worked out for the orderly liquidation of surplus war materials.

Mr. Crane closed by saying, "I think all of us should urge a taxing policy which would recognize in the future, as it has in the past, the importance of allowing the lucky prospector to become a rich man."

Halt Gold Sales to Stimulate Demand

According to a Reuters dispatch appearing recently in the *Wall Street Journal*, all sales of gold in Cairo, Egypt, have been suspended temporarily in an attempt to stimulate demand, which has been conspicuously absent in recent weeks. Gold had been offered for sale, in the form of ingots, for some time in an effort to mop up an excess of paper currency, to check a rise in prices, and to discourage hoarding. The experiment was initiated last November after consultation with British and American authorities and simultaneously with adoption of a similar policy by the Reserve Bank of India in Bombay. An identical experiment in Chile has been reported in the past few issues of this magazine. Subsequent reports indicated that the suspension had the desired effect, in that gold was later bought in Cairo for about $76 U.S. per ounce, a slight increase over previous prices paid in the first rush for the metal.

Lead Production and Average Price Paid Per Pound to Mines in Each Quota Group

By Districts, July-December, Inclusive, 1943.

	Total Production of Recoverable Lead (Tons)[a]	Over-Quota Production (Tons)	Amount Paid on Production	Amount Paid on Over-Quota Production[b]	Total Amount Paid	Average Price Paid Per Pound (Cents)
"A" QUOTA MINES						
Eastern	2,046	39	$ 265,980	$ 2,145	$ 268,125	6.55
Central (Other than Tri-State)	88,015	802	11,441,950	44,110	11,486,060	6.53
Western	89,613	33,720	11,649,690	1,854,600	13,504,290	7.53
Tri-State	12,952	12,241	1,683,760	673,255	2,357,015	9.10
Total	192,626	36,802	$25,041,380	$2,574,110	$27,615,490	7.17
"B" QUOTA MINES						
Eastern	203	203	$ 37,555	$ 11,165	$ 48,720	12.00
Central (Other than Tri-State)	807	430	149,295	23,650	172,945	10.72
Western	14,037	12,645	2,596,845	685,575	3,282,420	11.69
Tri-State	3,847	3,673	711,695	202,015	913,710	11.88
Total	18,894	16,771	$ 3,495,390	$ 922,405	$ 4,417,795	11.69
ALL MINES						
Eastern	2,249	242	$ 303,535	$ 13,310	$ 316,845	7.04
Central (Other than Tri-State)	88,822	1,232	11,591,245	67,760	11,659,005	6.56
Western	103,650	46,185	14,246,535	2,540,175	16,786,710	8.10
Tri-State	16,799	15,914	2,395,455	875,270	3,270,725	9.74
Total	211,520	63,573	$28,536,770	$3,496,515	$32,033,285	7.57

[a] Based upon monthly figures as reported by the Bureau of Mines for Eastern, Central, and Western states, and by the Metals Reserve Co., for the Tri-State District.

[b] Estimated on the basis of assigned quotas and over-quota production.

POWER

WHEN AND WHERE IT'S NEEDED

As America's production lines grow, the demand for coal, minerals and ores increases. Bigger loads and longer working hours require equipment that can take it and come back for more. That's why so many shuttlecars, trammers and electric locomotives are equipped with Exide-Ironclad Batteries. Their efficiency lies in their ability to provide a continuous, uninterrupted source of power. Exides deliver all the power needed to meet every demand, thus assuring a uniform working speed all day long.

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NEW BOOKS

MAGNESIUM, ITS PRODUCTION AND USES. By Ernest V. Pannell. Pitman Publishing Corp., New York and Chicago. Pp. 137. Price $4.

A descriptive manual in two parts. The first three chapters, about one-fifth of the book, are devoted to the physical and chemical properties of the metal, the natural sources of magnesium and a brief outline of methods of production. Part II, comprising six chapters, deals with the alloys of magnesium, their composition, heat-treatment, casting, working, corrosion and protection, and industrial applications.

PRODUCTION, JOBS, AND TAXES. By Harold M. Groves, McGraw-Hill Book Co., New York and London. Pp. 116. Price $1.25.

Business executives and others who are looking for information on the much-debated question of postwar taxation will profit by reading this volume. It is a research study by the Committee for Economic Development, and is the first of a series of such studies intended to point the way to avoiding mass unemployment in the postwar period. The author lays emphasis on the important role that federal taxation can play in encouraging business to create job opportunities. Twelve major issues in corporation and individual taxation are discussed, and definite proposals are made for new or revised measures that would make these taxes contribute to, and not deter, the effort to reach high levels of employment.

BASIC MATHEMATICS FOR ENGINEERS. By Paul G. Andres, Hugh J. Miser, and Haim Reingold. John Wiley and Sons, Inc., New York. Pp. 726. Price $4.

To be able to turn this book to advantage, users are expected to have had at least two years of high-school mathematics. The authors present those topics from algebra, trigonometry, and analytical geometry which they think are necessary for pursuing elementary engineering courses intelligently and as a preliminary to a course in calculus. Engineers desiring to brush up in mathematics presumably would find the volume useful.

QUIN'S METAL HANDBOOK AND STATISTICS 1943. Metal Information Bureau, Ltd., Newland House, Eynsham, Oxon, England. Pp. 320. Price 10s.

This is the 30th edition of the statistical record of ferrous and nonferrous metals, and is the fourth to be published under wartime conditions. The handbook is divided into two sections: the first is purely statistical, covering prices, imports, exports, production, and consumption of ores and metals, so far as available under wartime restrictions; the second includes a monograph on properties, uses, and specifications of metals and various alloys.

GOLD, THE REAL RULER OF THE WORLD. By Franklyn Hobbs. The Business Foundation Publications, 210 E. Ohio St., Chicago, Ill. Pp. 265. Price $3.50.

A discussion of gold from many angles, abundantly salted with the author's opinions. The treatment is eccentric and is aimed more at proving the views indicated in the title than in objective discussion of the history and problems of gold. If the reader is willing to put up with these defects, he will find included several outcroppings of common sense which would be useful in documenting a case for gold.

PRICE MAKING IN A DEMOCRACY. By Edwin G. Nourse. The Brookings Institution, Washington, D.C. Pp. 541. Price $3.50.

Focused primarily on the practical problems of the reconversion period, this book examines the fundamental principles of free enterprise and constructive competition. Admitting a bias in favor of free enterprise, the author nevertheless argues that it means economic freedom for everybody and must be truly enterprising, not merely protective. He believes that there is a desirable and attainable golden mean between laissez faire and dictatorial economies and that it is the duty of thoughtful, responsible leaders of business and organized labor to guide our economic life into channels that will insure high production and democratic sharing of benefits.

PUBLICATIONS RECEIVED

English-Chinese Automotive Nomenclature. Compiled and edited by Calvin C. Chang. Published by Marmon-Herrington Company, Inc., Indianapolis, Ind.

Manual of A.S.T.M. Standards on Refractory Materials. Prepared by A.S.T.M. Committee C-8 on Refractories. Covers specifications, classifications, methods of testing, definitions, standard samples, industrial surveys, and procedure for calculating heat losses. Published by American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. Pp. 210. Price $1.50; cloth $1.75.

Mesabi and Vermilion Ranges. Annual Report of Inspector of Mines, St. Louis County, Minnesota, 1943. Pp. 42.

Brazil. The following bulletins, in Portuguese, have been received from the National Department of Mineral Production, Rio de Janeiro: "Mineral Resources, 1942," Bulletin No. 56. . . . "Chrome in Piui, Minas Gerais," Pamphlet 50. . . . "Rock Crystal in Espirito Santo," Pamphlet 55. . . . "Primer for the Mica Prospector," Pamphlet 56. . . . "Mica in the State of Sao Paulo," Pamphlet 54. . . . "Zirconium in Poços de Caldas," Pamphlet 55. . . . "Mica in the Region of Sta. Maria de Suassui." . . . "Information on Equipment and Procedure for Recovering Alluvial Gold," Pamphlet 51.

French West Africa. "Geological Studies on the Sahara," Bulletin 6, Service des Mines, Dakar. Pp. 194.

The U. S. Geological Survey has issued the following bulletins. Copies may be obtained from the Superintendent of Documents, Washington, D.C., at the price stated:

"Relations of Structure to Mineral Deposition at the Independence Mine, Alaska." By W. C. Stoll. Bulletin 933-C. Pp. 201–216. Price 15c.

"Tungsten Deposits, Isla de Pinos, Cuba." By L. R. Page and J. F. McAllister. Bulletin 935-D. Pp. 177–246, plus maps. Price $1.25.

"Manganese Deposits in Part of the Sierra Maestra, Cuba." By C. F. Park, Jr., and M. W. Cox. Pp. 307–355, plus maps. Price 75 cents.

"Manganese Deposits of the Sweet Springs District, West Virginia and Virginia." By H. S. Ladd. Pp. 199–217, plus maps. Price 35 cents.

"Tungsten Deposits in the Boriana District and the Aquarius Range, Mohave County, Arizona." By S. W. Hobbs. Bulletin 941-I. Price 40 cents.

"Geological and Geophysical Survey of Fluorspar Areas in Hardin County, Illinois." Part I, by L. W. Currier, Part II by M. King Hubbert. Bulletin 942. Pp. 150 plus maps. Price $1.25.

"Bibliography of North American Geology, 1929–1939." By Emma Mertins Thom. Part I, Bibliography, pp. 1063, price $2.50. Part II, Index, pp. 1064–156, price $2.50.

The U.S. Bureau of Mines, Washington, D. C., has issued the following information circular. No charge is made:

"Langbeinite." By B. L. Johnson. I. C. 7277. Pp. 12.

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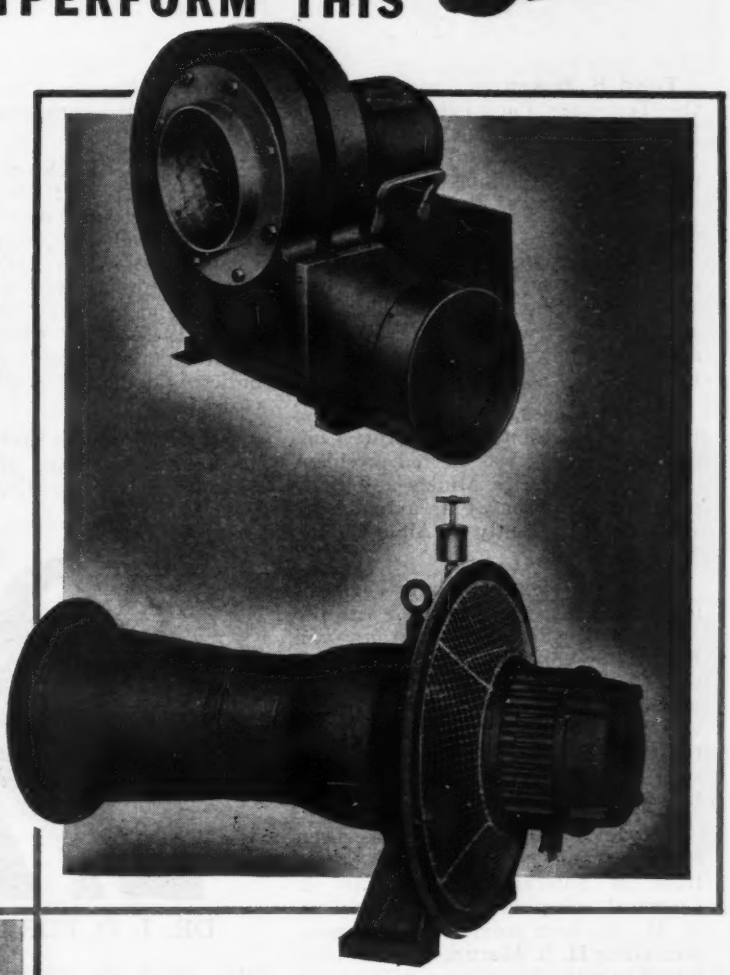

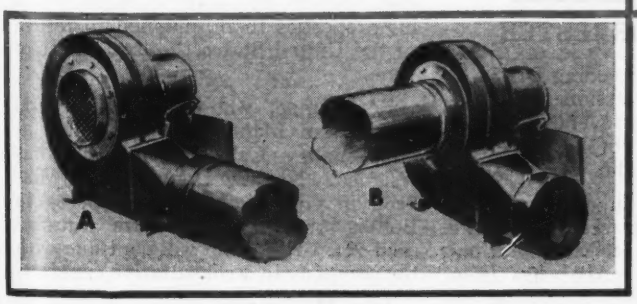

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PERSONAL NEWS

Floyd B. Bowen is now manager of the Tennessee Phosphate Division of International Minerals & Chemical Corp., at Columbia, Tenn. He was formerly general mining superintendent of the company's Florida Phosphate Division.

L. C. Whitaker has resigned as associate director of WPB's Mining Division, to return to private business activities in New York. He will, however, continue to serve as a consultant to the officials of the division.

Horace Moses, general manager of the Chino division of Kennecott Copper Corporation, was elected president of the New Mexico Miners and Prospectors Association at its annual convention held recently at Albuquerque, N. M.

Russell C. Fleming, mining engineer, for the past two years engaged with the National Department of Mines and FEA in Brazil, and formerly editor of the *Mining Congress Journal*, has resigned from government service and will be in charge of raw materials for the Companhia Siderugica Nacional steel plant at Volta Redonda, State of Rio de Janeiro, Brazil.

George T. Harley, who has been assistant manager of the potash operations of International Minerals & Chemical Corporation at Carlsbad, N. M., has been promoted to manager, succeeding **H. S. Martin,** who has been forced to retire for reasons of ill health. **J. P. Margeson, Jr.,** vice president, is in charge of the company's Potash Division. In announcing this change he said, "Mr. Martin has made an outstanding contribution to the success of the Corporation's potash activities at Carlsbad, and we regret that it has been necessary for him to retire from the management of our production."

Eugene Carter Anderson, formerly chief engineer at Carlsbad, N. M., for International Minerals & Chemicals Corporation, and more recently connected with the company's fluorspar activities at Gila, in the same State, has been transferred to International's Phosphate Division as manager of its Montana phosphate operations.

J. R. Van Fleet has been elected president of the United States Vanadium Corporation, with headquarters in New York. Other personnel changes in a recent reorganization include the appointment of **Blair Burwell,** as vice president, New York; **W. G. Haldane,** in charge of operations, with headquarters in New York; **J. L. Robison,** general superintendent at Grand Junction, Colo.; **C. C. Sterns,** superintendent at Rifle, Colo.; **D. E. Harrison,** superintendent at Uravan, Colo.; and **M. N. Shaw,** general superintendent at Bishop, Calif.

Henry W. Erickson, deputy administrator of WPB Order L-208 (the gold-mine closing directive) has resigned and taken a position with Allis-Chalmers Mfg. Co. Mr. Erickson was formerly an analyst in the Metals Section and had been with WPB since March 1943. **F. W. Christiansen,** chief of the Metals Section, will take over his duties as deputy administrator of Order L-208.

Dr. J. D. Forrester has been appointed head of the mining department of Missouri School of Mines and Metal-

DR. J. D. FORRESTER

lurgy, Rolla, Mo., succeeding **Dr. S. A. Trengove,** and will assume his new position Aug. 1. For several years he has been on the faculty of the University of Idaho, Moscow, Idaho.

Carl Linderholm, supervising engineer for the mining section of the Reconstruction Finance Corporation, office at Little Rock, Ark., has been transferred to Denver, according to **A. Ben Shallit,** supervising engineer of the Joplin RFC office. Linderholm's files from the Little Rock office, including records of federal loans on titanium, zinc, and lead properties in Arkansas, have been transferred to the Joplin office.

T. W. McCormick, of Ishpeming, Mich., safety director for Inland Steel Co.'s iron mines, has been elected general chairman of the Lake Superior Mining Section of the National Safety Council for 1945. **H. F. Stewart,** of Cooley, Minn., safety engineer for Butler Brothers, was elected vice chairman.

Richard H. Jahns and **Roswell Miller, III,** geologists, have been assigned to a geologic branch office of the U. S. Geological Survey which has just been opened at Asheville, N. C., in an effort to increase mica production in the area.

R. E. Renshaw has joined the exploration department of Pioneer Gold Mines of B.C., Ltd., and is currently making examinations in Yukon.

George W. Hallock, president and general manager, Sixteen-to-One Extension Mining Co., Alleghany, Calif., and a member of the State Mining Board, has been reelected president of the California Hydraulic Mining Association.

Neal M. Muir has returned to the United States after spending 20 months in Alaska, and is at present engaged on exploration work on the Rose Run iron property in Bath County, Ky., for the U. S. Bureau of Mines.

Hugh W. Coke, formerly general superintendent for Atolia Mining Co., a Bradley operation, at Atolia, Calif., is now at the Bradley Mining Co's. Harvard mine, at Jamestown, Tuolumne County, Calif. The Atolia operation was shut down when Metals Reserve tungsten contracts were terminated recently.

Mauricio Hochschild, who has long been extensively interested in mining enterprises in Bolivia, recently adjusted his difficulties with the government of that country, and, after an inspection of his properties there, planned to return to the United States the latter part of June.

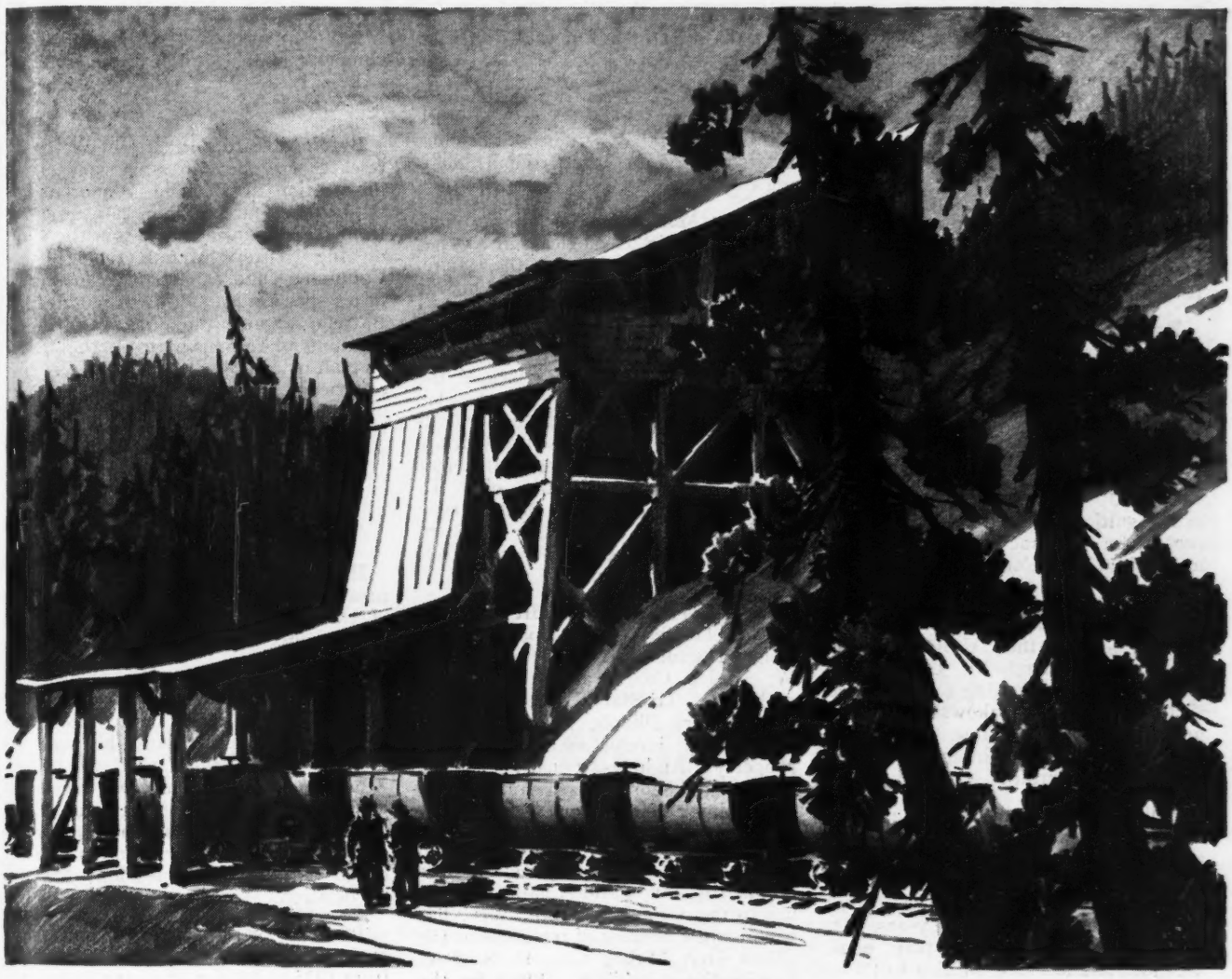
Bert Crase, who has been general manager of Idaho Maryland mine, at Grass Valley, Calif., for 18 years, has resigned. **Neal O'Donnell,** who has been in charge of a tin property in Bolivia for the past six years, will succeed Mr. Crase, who will continue with the company in a consultative capacity.

John M. Conrow, mining engineer of Butte, Mont., is conducting special mine examinations in Utah for **George M. Fowler,** of Joplin, Mo.

Samuel W. Anderson, who has been serving as deputy vice chairman for metals and minerals of the War Production Board since Jan. 1 of this year, has been appointed program vice chairman and chairman of the Requirements Committee. Mr. Anderson joined the staff of the Aluminum and Magnesium Division of the Office of Production Management in October 1941, and served in that Division until his appointment as deputy vice chairman.

Dr. L. Keith Ward, for 33 years Government Geologist and Director of Mines in South Australia, has retired.

Charles E. Prior, formerly with the Fresnillo Co., Fresnillo, Zacatecas,



YELLOW PINE

The story of antimony production in the United States is the story of Yellow Pine.

It all began in the primitive Yellow Pine region of Idaho. Here, in 1927, F. W. Bradley acquired the Meadow Creek Mine. Operations were hardly under way in the old gold claims when antimony was discovered. Antimony—trouble-making, costly antimony—a major obstacle to the economical beneficiation of the ore. Even efforts to market antimony flotation concentrates failed.

But antimony is a "black sheep" no more. World-wide war and modern science have changed all that. For war placed high priority on antimony—and the flotation process provided an urgently needed production answer.

Today Yellow Pine, owned by the Bradley Mining Company, is producing a majority of the antimony output in the United States. And from this same mine comes a large part of the tungsten.

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DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY

Mexico, is now in charge of the Cuban agency of the U. S. Commercial Co., purchasing organization for the Foreign Economic Administration, Apt. 306, Santiago, Cuba.

Otto Herres, formerly assistant to the general manager of Combined Metals Reduction Co., and more recently manager for the large titanium project of National Lead's MacIntyre Development in New York State, has returned to Combined Metals.

Robert W. Hughes has been made general manager for Miami Copper Co., succeeding **Arno S. Winther,** resigned. Mr. Hughes had been mine superintendent for the past eight years.

Dr. Lloyd M. Pidgeon was on June 8 presented by the University of Toronto with the Charles prize of $1,000, in recognition of his development of a process for the practical production of magnesium from Canadian dolomite.

J. A. Noble, chief geologist of the Homestake Mining Co. at Lead, S. D., recently visited the Tri-State mining field. Accompanied by **George M. Fowler,** Joplin consulting geologist, and **Victor** and **Russell Rakowsky,** he went underground at the Blue Goose mine of the Eagle-Picher Mining & Smelting Co., south of Cardin.

William Bell Hetherington, a member of the Canadian Institute of Mining and Metallurgy since 1916, was awarded a special prize at the recent meeting of the Institute at Toronto. Associated with gold mining for many years, Mr. Hetherington is at present plant engineer for East Malartic Mining Ltd.

W. R. Lindsay formerly assistant general manager of Granby Consolidated Mining, Smelting & Power Co., Ltd., at Allenby and Copper Mountain B.C., is opening an office at 302 Bay St., Toronto, and will do examination and exploration for New York interests.

Percy G. Dobson, directing engineer for the Summit King Mines, Ltd., subsidiary of Bralorne Mines, Ltd., with a gold mine and 70-ton cyanide mill in Churchill County, Nev., closed by WPB order, has been inspecting mine properties in several Arizona districts.

H. J. O'Carroll, for some time assistant superintendent of the Kennecott smelter at McGill, Nev., has left for Chile to assume a similar position with the Braden Copper Co., another Kennecott unit.

Glenn L. Allen, district engineer in Nevada for the U. S. Bureau of Mines, has been at his Reno office, having inspected work of six Bureau of Mines drilling crews and two geophysical survey units in widely separated Nevada districts.

Dr. George A. Thiel has been appointed chairman of the geological department of the University of Minnesota, succeeding **Dr. William H. Emmons,** and **Dr. F. F. Grout** will take over the directorship of the Minnesota Geological Survey.

H. G. Dwyer recently left the Anaconda Copper Mining Co. in New York for Tooele, Utah, where he will be chief draftsman for the International Smelting Co.

James McKim, senior mining engineer of the U. S. Geological Survey, has resigned as supervisor of the Miami office of the Survey, which had charge of leasing arrangements on Indian lands of the Quapaw Indian Agency. McKim, who was transferred to Miami from the Salt Lake City office of the Survey in February, 1942, succeeded **Colonel Charles F. Williams,** who is now serving with the Chemical Warfare Service. Supervision of the Miami office will be under the direction of **J. D. Turner,** of the McAlester, Okla., survey office, who will spend the necessary time in the mining field to carry out the supervisory work.

Irving W. (Andy) Andrews, well-known Tri-State mine operator, has resigned as superintendent for the M. & W. Mining Co. to accept a position with the Tri-State Zinc, Inc., in northwestern Illinois, where the latter company is developing a new mining property. Andrews, a marine veteran of the first World War, came to the local mining field a score of years ago.

Walter L. Maxson, metallurgist, and manager and chief engineer of the mining division of Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has been named director of research for the Oliver Iron Mining Co., U. S. Steel Corporation subsidiary. Plans for the establishment of a new iron ore research laboratory to centralize research activities of the Oliver Iron Mining Company were made known recently when the mining company acquired a modern four-story building in Duluth.

Dean James Fisher, after 50 years as teacher, 46 as department head at Michigan College of Mining and Technology, retired July 1 from his classroom duties and the chairmanship of the department of mathematics and physics. He remains as dean, and is also directing the newly established extension division. Dr. Fisher has been prominent not only in scientific, engineering, and educational circles but in civic affairs and as historian of the copper and iron regions of Michigan. He is succeeded as department head by **Prof. John M. Harrington** (mathematics) and **Prof. F. L. Partlo** (physics).

Vincent D. Perry has been advanced to chief geologist of International Smelting & Refining Co., succeeding **Tom Lyon,** who is promoted to assistant to the manager, **Frank A. Wardlaw, Jr.** Mr. Perry has been connected with the Anaconda Copper Mining Co. organization 20 years, having been chief geologist of the Cananea Consolidated Copper Co., in Mexico, and more recently chief of raw material exploration for I.S.&R. Mr. Lyon, formerly on the Anaconda company staff at Butte, came to Salt Lake City in 1922 as chief geologist of I.S. & R.

Byron M. Bird, formerly in charge of research in ore dressing and coal preparation at Battelle Memorial Institute, Columbus, Ohio, has resigned from that organization to join the staff of the Jeffrey Manufacturing Co., Columbus, Ohio, as technical consultant in his specialities. Prior to joining the Battelle organization Mr. Bird held positions of responsibility in the U. S. Bureau of Mines. In the course of his experience he has taken out a number of patents on jigs, classifiers, concentrators, and centrifugal dryers.

OBITUARIES

H. Edward Manville, retired, former president and chairman of the board of the Johns-Manville Corp., died at Pleasantville, N. Y., of June 27, at the age of 72.

Sir Colin Fraser, Australian mining and industrial leader, died March 11. Educated in New Zealand, he went to London after service with the New Zealand geological survey. He was a director in various mining companies, a councillor of the Australasian Institute of Mining and Metallurgy and president of the Australian Mines and Metals Association.

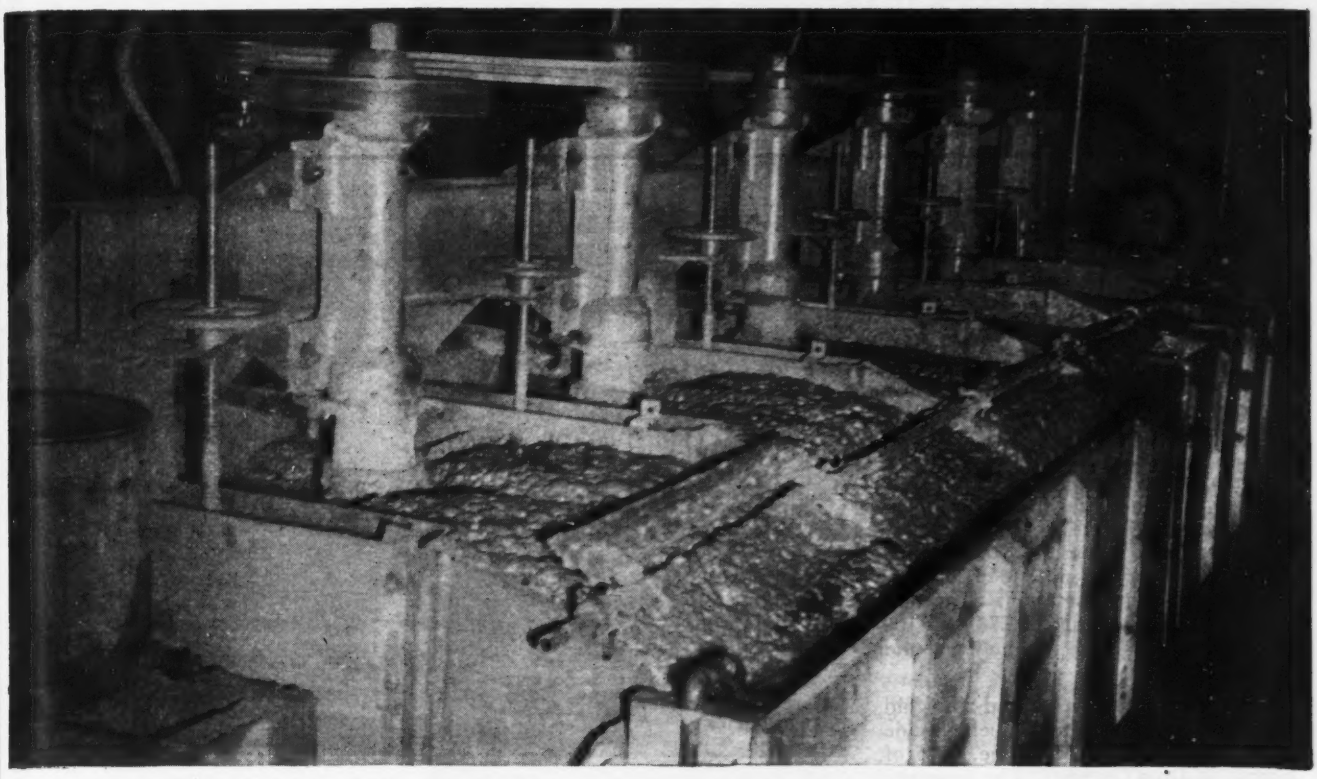
John V. W. Reynders, consulting engineer, president of the A.I.M.E. from 1925 to 1926, and on the Institute board for many years, died in New York City on July 10 at the age of 78.

Arthur D. Lord, a mining engineer who early in his career was associated with Ontario and Montana mining enterprises, and who, prior to his retirement 15 years ago was senior member of the bond brokerage firm of A. D. Lord & Co., of New York, died at East Orange, N. J., on June 15 at the age of 68.

Walter F. Arms, Sr., a mining engineer who had practiced his profession in Los Angeles for 37 years, died in that city on June 14. His age was 87.

William Val De Camp, mining engineer and prominent in the Southwest for many years, died in Los Angeles on June 16 at the age of 57. Mr. De Camp was formerly manager of United Verde Copper Co. at Jerome, Ariz.; the Cardinal gold property, at Bishop, Calif.; and Yellow Aster, at Randsburg, Calif. Until a few months before his death he had been manager of mines for Compania Minera de Oruro, owned by the Hochschild interests, one of the world's largest tin properties, with headquarters at Oruro, Bolivia.

Joshua P. Gibson, mining engineer, died in Los Angeles on May 24 at the age of 75.



ZINCTON INSTALLED DENVER "SUB-A"

INCREASED CAPACITY 35%... IMPROVED ZINC RECOVERY 7.5%... CUT COST

When Sheep Creek Gold Mines, Ltd., British Columbia, purchased the Lucky Jim Mine, now their Zincton Unit, they immediately started modernizing the entire plant. Changes in the crushing plant increased the mill's capacity from 175 tons per day to 260. A 2-cell No. 21 (Deep) Denver "Sub-A" Flotation Machine was installed to remove graphite ahead of zinc flotation. Capacity and recoveries were then limited by results obtainable in the zinc flotation section.

After careful analysis of the metallurgical problems a Denver Conditioner and two 6-cell SUPERCHARGED No. 21 (Deep) Denver "Sub-A" Flotation Machines were installed to replace the two 10-cell older MS type flotation machines. The resulting increase in flotation efficiency and capacity has made this a very successful operation.

Saves $207 per day

This installation not only increased the company's revenue through additional zinc recovery but cut costs $207 per day . . . 21 cents per ton saving on reagents . . . 21 cents per ton reduction in mill costs . . . $1.00 decrease in smelter charge per ton of concentrates.

The entire Denver "Sub-A" zinc flotation circuit is in an area less than 360 sq. ft. where all pulp and concentrate flows are by gravity.

FACTORS	BEFORE	WITH DENVER "SUB-A"	RESULTS
Plant capacity, tons per day	260	350	34.6% increase
Grade of concentrate % zinc	56	58	3.6% increase
% zinc recovery	86	92.5	7.5% increase
Reagent cost, cents per ton	46	25	45.6% decrease
% iron in zinc concentrates	6.0	4.8	Saves $1.00 per ton of concts. on smelter charge.
Tons handled per zinc-flotation Hp including conditioner	5.2	5.4	3.9% increase
Milling costs	$1.41	$1.20	14.9% decrease
Tons handled per cu. ft. volume of flotation machines	.52	.583	12.1% increase

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REGIONAL NEWS

CALIFORNIA

Hoefling Brothers expand placer tungsten mining—Big Butte mine resumes limited operation

★Announcement by the California Insurance Commissioner that compensation insurance rates for mining have been reduced 8 percent on mining operations is a welcome bit of news to mine owners and operators. The new rate for surface mining is $3.78 per $100 of payroll, and that for underground mining $8.56.

★Regular shipments of lead-zinc-gold ore to Western smelters are being made from the Gold Bottom mine, east of Trona, in Inyo County. The property is operated by Damon & Damon, who recently acquired the adjoining Ophir mine and are erecting a mill at the Ophir to treat the joint mineral output. Until Pearl Harbor the mines were worked for gold, but current efforts are aimed at lead-zinc ores.

★Limited operations have been resumed at the Big Butte property of Butte Lode Mining Co., Bert Wegman, general manager, following issuance of a permit by WPB, which authorizes the company to accept custom ore up to 100 tons from individual operators active prior to the gold-mine closing order. Workers in the mill and mines are restricted to men not available for the armed service or war industries. Several small operators are interested in milling operations with the company. The Big Butte mine, near Randsburg, Kern County, had been operated almost continuously since 1897 until shut down by the gold-mine closing order.

★Following completion of an agreement with Atolia Mining Co., Hoefling Brothers, of Sacramento, are extending their tungsten placer operations from the lower Spud Patch Placers section to areas adjacent to Atolia veins. To facilitate the program, Atolia Mining has released a 1-yd. power shovel to Hoefling Brothers as well as the repair shop at the mill. The Spud Patch Placers area is worked by two draglines, the tungsten-bearing gravel being trucked to the washing plant near Cuddeback Lake property, operation of which was described in *E.&M.J.*, Vol. 144, No. 12, December 1943, pp. 94–96). About 30 men are currently employed under the direction of Allan E. Jones, manager, and it is the intention of the company to make available to leasers any favorable lode showings uncovered during stripping overburden and removing placer material proper. Atolia Mining Co., which carried on underground mining operations at its nearby property, recently halted production and terminated leases.

Cyanide mill of Consolidated Chollar, Gould & Savage Mining Co., Gold Hill, Nev., which is treating about 300 tons daily of ore trucked from the old Con. Virginia mine by the newly organized Virginia City Mining Co.

★Milling operations at the Pine Creek tungsten mine, near Bishop, Inyo County, operated by U. S. Vanadium Corp., are again conducted on a seven-day-a-week schedule, according to an announcement by M. N. Shaw, general superintendent. The company is a subsidiary of Union Carbide Co. J. R. van Fleet is vice president and general manager.

NEVADA

Manpower shortage cuts Copper Canyon output—Goodsprings drilling continued

★Hampered by labor shortage at its leased Copper Canyon mine and 300-ton flotation mill in Lander County, International Smelting & Refining Co. is reported producing concentrate at two-thirds of capacity, employing 80 miners instead of the 150 required for a full crew. Oxidized copper-gold ore overlying the sulphide above the 350-ft. level has been worked out, and the mill is treating sulphide ore mined above the 500-ft. level. Sinking and diamond drilling are in progress below this level. J. J. Lillie, Battle Mountain, is manager.

★It is announced that the Kennecott geological and exploration departments of the Nevada division at McGill are seeking ore deposits of any kind that may warrant development in Nevada and other mining states. Whereas the corporation heretofore has centered its activities on copper, it has been indicated that any precious or industrial metal is acceptable.

★Exploration drilling in the Goodsprings district, Clark County, is being continued by the U. S. Bureau of Mines, the Metals Reserve stockpile and depot at Jean, five miles distant on the Union Pacific railroad, having been closed on June 1 after 25,000 tons of oxidized lead-zinc ore had been delivered from Goodsprings mines. Chief producer has been the old Yellow Pine mine, operated by the Coronado Copper & Zinc Co., controlled by the Mudd interests, of Los Angeles. P. A. Simon, of Las Vegas, is operating a 100-ton calcining plant on tailing from an old concentrator, shipping a product above the Metals Reserve 17 percent minimum to Coffeeville, Kan. He is preparing to crush and calcine mine ore.

★Engineers of the geophysics department of the Bureau of Mines, from the Reno office, are conducting an extended survey of property of the Mountain City Consolidated Copper Co., adjoining on the west the productive Rio Tinto mine of the Mountain City Copper Co., an Anaconda unit. Impor-

tant orebodies are said to have been developed in the western part of the Rio Tinto, near the ground now under survey, in which development of considerable extent has opened low-grade copper ore of great width beneath a gossan similar to that overlying the Rio Tinto orebodies, but still above the sulphide zone. George B. Thatcher, attorney of Reno, is president; Pat Mooney, deputy U. S. collector of internal revenue, secretary-treasurer, and M. E. Bohannan, manager.

★Tonopah Divide Mining Co. reports a net loss in 1943 of $5,192, with gross income of $5,642, of which only $1,148 consisted of royalties from leases. Total expenses for the year were $10,834. The silver-gold mine, six miles south of Tonopah, in Esmeralda County, has been worked only by lessees in late years. E. J. Erickson, of Reno, is manager.

★The lately organized Virginia City Mining Co., headed by Guy M. Standifer, Balfour Building, San Francisco, is employing around a dozen trucks to transport ore from open-cut workings on the Ophir claim of the Consolidated Virginia Mining Co. at Virginia City to the 400-ton cyanide mill of the Consolidated Chollar, Gould & Savage Mining Co. at Gold Hill, two miles distant, leased by the new concern and now treating upwards of 300 tons per day. Clyde E. Collins, of Virginia City, is superintendent, and Roy A. Hardy, 206 Virginia St., Reno, consulting engineer.

★The only mercury producer continuing to operate in Nevada is Cordero Mining Co., with 125-ton Nichols-Herreshoff furnace running part time in northern Humboldt County and headed by J. Edgar Pew, of the Sun Oil Co. at Philadelphia. The manager, D. Ford McCormick, of McDermitt, Nev., is continuing to sink a 500-ft. main shaft. The plant of Pershing Quicksilver Co. in Pershing county, 80-ton Nichols-Herreshoff and 60-ton Gould rotary furnaces, has been closed and is to be sold. H. B. Chessher, Gazette Building, Reno, is head of the company. San Francisco buyers seeking Nevada mercury are offering no more than $85 per flask.

★Construction of a 100-ton cyanide mill, to be the first unit of a larger plant, is nearing completion at the Hale & Norcross mine of Central Comstock Mines Corp., in Virginia City, under direction of C. T. Wells. Charles Yore, secretary, is making headquarters at the property. Started last year, construction was delayed by the death late in the year of A. E. Vandercook, engineer and metallurgist.

★Enlargement of the 600-ton selective-flotation mill of Combined Metals Reduction Co. at Pioche is so far advanced that the new equipment is reported in service and treating nearly 1,200 tons per day. Lead-silver concentrate is shipped to the company's smelter at Bauer, Utah, and zinc concentrate to Texas. Ed H. Snyder is president.

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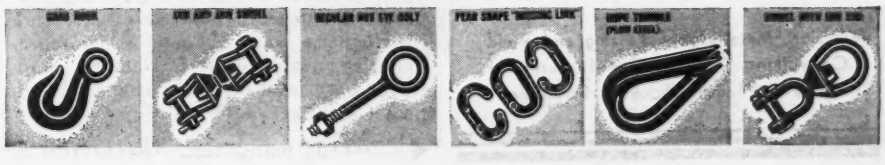

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NEW MEXICO

School of Mines cuts faculty—Manganese concentrator under construction at Socorro

★Six faculty members of the New Mexico School of Mines at Socorro have been informed that their contracts will not be renewed. Only four professors and the president of the school will be retained next year, according to an announcement in the Socorro *Chieftain* recently. This action was made necessary when practically the entire student body of the school was removed when the Army gave up its special training program. Plans for the next year have not yet been completed. Those faculty members retained are: President R. H. Reece; Prof. F. C. M. Smithson, chemistry; George Vorbe, petroleum engineering and geology; Donald C. Crosno, engineering; and Francis Hickman, engineering. Those not returning are: Dr. Sterling B. Talmage, geology; Dean A. S. Walter, with the mining department since 1922; T. J. Spannagel, civil engineering; John M. Weidman, history; George Bishop, physics; Martin Speare, Spanish and library.

★The lead-zinc mill under construction at Silver City for New Mexico Ore Processing Co. has been completed and is in operation. Construction was directed by K. F. Fulton, of Boulder, Colo., and E. C. Casner, mill superintendent, is now in charge. The company is now sinking several churn-drill holes in search of additional water, and if it is found, the mill will soon be operating at full capacity.

★Grant County is suffering one of the worst droughts in many years, according to the Silver City water department, and its effect is being felt by all of the county's mines. Milling operations have not been impeded, but the camps are suffering for lack of water for domestic uses.

★In the annual report of U. S. Smelting, Refining & Mining Co., the company's lead-zinc mine at Bayard was reported as having begun producing at a 250-ton rate in March, 1943. At present, the mill is treating 400 tons daily, and results are said to be good. Active development work is under way.

★John Kelly, director of the State Bureau of Mines, and Charles Johnson, representing the U.S.B.M. at Silver City, have discussed a program for investigating the State's iron-ore deposits and have agreed to ask increased federal funds for the work. This year's allocation, devoted largely to prospecting for fluorspar, was $30,000. Next year, $100,000 will be asked for a study of iron-ore deposits near Silver City and in southern New Mexico, of fluorspar deposits near Grants, Deming, and Silver City, and of one coking coal bed near Carthage.

★A 300-ton manganese concentrator is being erected near Socorro by Southwestern Engineering Co., Los Angeles, for United Mining & Milling Co., of Socorro, Morgan G. Huntington, president. Most of the equipment in the plant will come from the Grey Eagle chrome concentrator in Glenn County, Calif. (See *E.&M.J.*, Oct., 1942), which was built for Rustless Mining Corp. in 1940 by Southwestern. Two orebodies, both low grade, have been located; one, the Nigger Head property, is 11 miles west of Socorro, the other, the Red Hill, is 8 miles southwest of the town. They will be worked as open pits. The mill will be situated about six miles south of Socorro on a site chosen for water supply, available power, and opportunity for tailing disposal. About 35 men will be employed by the company, which anticipates about three years' operation on the present deposits. It is hoped to have the mill in production by the middle of August.

COLORADO

Urad molybdenum mine enters production—Leadville tunnel reaches hard rock

★Molybdenum Corporation of America started production at its Urad mine, near Empire, Colo., on April 1, on completion of comprehensive mine development and plant construction. New installations include a power line, an underground primary crushing plant, motor haulage through the main tunnel, an outside secondary crushing plant, and a concentrator. The crushing plants have a capacity of 50 tons per hour, and the concentrator, 250 tons per day. Because the plant is at an elevation of 10,000 ft., all surface buildings are steam-heated and heavily insulated. Plant design and construction was carried out by Southwestern Engineering Co., of Los Angeles. Whitaker & Schlereth, of Denver, consulting engineers for Molybdenum Corporation, directed the entire program. W. J. Eaton is general superintendent in charge at Urad, and F. C. Blickensderfer is mill superintendent.

★R. E. Mackey reports from Kokomo that he is in complete charge there of the Lucky Strike mining operation, which was recently taken over by the A. S. & R. M. W. Rankin, formerly in charge, has been transferred to other duties in Salt Lake City. Mr. Mackey says nearly 500 ft. of drift has been run in the new Victory tunnel, two crews are at work, and he expects to be shipping ore by the middle of July. The diamond drilling is completed for the present, and the surface buildings are also about complete.

★Colorado Sunrise Mining Co., headed by Harold R. Owens, is extending the main development tunnel in its property, now in 600 ft., an additional 100 ft., to contact the Ajax and Sunrise

veins. This zinc-copper-gold-silver-lead property, held under lease from Joseph R. Brown, and operated by Ralph B. Wright, general manager, is near Ouray.

★G. K. Bjorklund, general superintendent, has over 40 men employed at Alta Mines, Inc., near Ophir, where they mine and mill 125 tons of copper-zinc-lead ore daily.

★The Mineral Park placer property, near Alma, owned by Wilbur Lewis, of Fairplay, will soon be mined by power shovel. Lead and silver, but no gold, are found in the deposit, and it can be mined by removing the top 10 ft. of overburden. A. E. Moynahan, consulting engineer, reports that a shaft has been sunk 35 ft. and about 60 ft. of drift work completed.

★Wilfley Leasing Co., Kokomo, has the following personnel: Jack J. Walsh, Denver, president; Charles G. Blaha, general manager; J. C. Young, mine superintendent; James C. Snodgrass, master mechanic; and Albert D. Zemck, chief electrician. The development program to block out 20,000 tons of zinc-lead-gold ore is nearly half completed. This property, leased from Wilfley Mining and Development Co., is opened by about 1,500 ft. of workings.

★L. K. Requa, vice president, and William M. Cutler, general manager, of Revenue Mines Co., near Ouray, have a development program under way.

★The cinnabar discovery in Cochetopa Canyon, originally leased by O. F. Norton and O. J. Dufresne, will soon be exploited by Norton Dufresne Associates. As soon as suitable machinery can be installed, development work will be started. A third examination of the property has been made, and Charles Williamson, of Winnemucca, Nev., has been placed in charge of operations. J. J. Hill, chief engineer for the Colorado Mercury Mines, reports that the chief center of importance is around a volcanic pipe and certain fumaroles which have visibly affected five of the claims by disgorgement of quartz, quartzite, porphyry, altered granite, and considerable breccia, all carrying cinnabar either as stringers or as infusions in the softer species. Further high values have been found along two intrusive dikes; and the geology of the deposit indicates that the main orebodies lie in shallow layers near the surface. The country rock is Morrison sandstone, and an enormous amount of float lying on the hillside carried values even though leached and weathered. Additional exploration will probably be carried on by churn drills and the use of bulldozers.

★Slide Mines, a former gold-silver producer, is producing a small quantity of zinc-lead and tungsten ores. As soon as possible the company will reopen the gold-silver mine above Boulder, and also the 75-ton mil. W. J. McDonald is general superintendent; J. H. Rodgers, general manager. Ward E. Terry, president, is in the Army.

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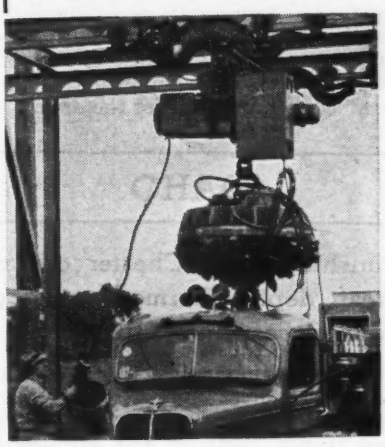

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Colorado (*Continued*)

★Paul Corey, operating the Rip Van Dam mine, at Jimtown, for Dr. C. O. Weiderburg, of Springfield, Ill., has uncovered a vein of exceptionally rich sylvanite. The King Wilhelm and Badger group, adjoining the Rip Van Dam, and which can be worked from its tunnel independently, have been purchased from George H. Teal, of Boulder. The development program at the Rip Van Dam has been in operation for more than a year and a half, and several weeks will yet be required to determine the extent of the vein.

★George W. Jump, general manager of the P&J Mining Co., at Westcliffe, has started production of zinc, lead, silver, and gold ore. The company, operating the Bull Domingo mine, is completing unwatering and rehabilitation; and a milling plant has been installed and mill operations are under Clyde Jump.

★Charles C. Goulding expects to reopen the Silver Crown silver-lead mine, near Durango, this summer. The property is opened to a depth of 3,800 ft. by tunnel, and is ready for production. It is necessary to install a compressor and 1,200 ft. of airline.

★The Leadville drainage tunnel is now operating in solid ground, having passed the loose formation that made progress slow. The tunnel cuts under the highway at a depth of around 100 ft. and care was necessary because of the soft ground. Two air compressors will be installed to furnish air for the drills.

IDAHO

Sunshine seeks Chester ore at great depth—Hermes mercury mine closes—Men still needed

★Sunshine Mining Co. is going deep for the rich silver-lead ore recently discovered in the Chester fault-fissure vein system north of and paralleling the Sunshine vein. According to R. D. Leisk, general manager, the company has started a crosscut on the 3,700 level, lowest in the mine, which will open the Chester orebodies 1,000 ft. below sea level and 600 ft. below the present lowest development on the 3,100 level. Production from the new area keeps the 1,100-ton Sunshine concentrating plant operating at capacity and production from the Sunshine vein has been temporarily suspended because of the higher lead content of ore from the Chester vein. All operations, however, are seriously handicapped because of the manpower shortage. As an illustration of the labor difficulty, Sunshine lost 28 men during May and with the help of special employment offices in Wallace and Kellogg was able to hire only 12 men during the same period.

★The Chester vein orebody has now been proved for more than 1,000 ft. in length on the 2,700, or sea-level, opening of the mine, and for a vertical distance of 600 ft. on the dip of the vein, in all of which development it has a known average width of 8 ft. In some places it is 20 ft. wide. Picked samples of the silver-copper ore are running as high as 2,800 oz. silver and 23 percent copper, and choice samples of the lead ore run 82 percent lead and 90 oz. silver. The average mill feed is exceptionally high grade in silver, copper, and lead. The territory involved in the discovery has been divided into three sections, which are called the Rambo area, covering 4,000 ft. on the strike of the vein, and is owned by Sunshine and Silver Syndicate Mining companies; the Omega area, covering 2,200 ft. on the vein east of the discovery, and owned by Sunshine and Polaris Mining companies; and the Rotbart area, consisting of 400 ft. of the vein area within the confines of the Omega area, which is owned by Sunshine, Polaris, Silver Dollar, and Lincoln mining companies. These three areas are mined and milled separately under different contract agreements, which were drawn up by the interested companies to avoid costly and time-consuming extralateral rights lawsuits.

★The Hermes quicksilver mine, second largest quicksilver producer in the United States in 1943, has closed because of the drop in the price of quicksilver. The Hermes property adjoins the Bradley Mining company's rich tungsten-antimony-gold mine, in the Yellow Pine district of Idaho. Main orebodies of the Hermes property were discovered two years ago as a result of diamond-drill operations by the U. S. Bure u of M n .

★The Ray Jefferson mill, of 150 tons' capacity, located in the Beaver mining district north of Wallace, has been reconditioned by Monitor Mining Co. for the flotation treatment of zinc-lead ores from the Monitor mine and other properties opened by that company in the Beaver district. Henry L. Day, manager of the company, states the different properties of the Monitor company could now produce 400 tons of zinc-lead ore per day if manpower were available.

★Whitedelf Mining Co., owned largely by Congressman Compton I. White, is connecting its old and new workings on both sides of Howe Mountain at Clarks Fork, Idaho. The mine has been an important shipper of lead-silver ore from comparatively shallow workings. The present reopening program involves sinking a shaft to 600 ft. below the former productive levels.

★Contract for the construction of the Simplot phosphate works at Pocatello, costing around $1,000,000, has been awarded to Frank Kloepfer, of Boise, on a bid of $131,000. When completed, the plant will use phosphate rock from the Conda mine of the Anaconda Copper Mining Co. at Conda, Idaho. The sulphuric acid used in the process will come from the Garfield, Utah, plant of the A.S.&R..

★Walter Hovey Hill, veteran mining engineer of Grangeville, reports the opening of a new zinc-lead mine on the Middlefork of the Clearwater River near Kooskia, Idaho. The mine is an abandoned property known as the "Rusty Lode." Hill says the vein is around 20 ft. wide and will average 20 to 25 percent zinc. He is shipping the ore to Salt Lake smelters.

★Hansy Copper & Gold Mining Co.'s property near Adair, Idaho, on the main line of the Milwaukee Railway, has been leased to Coeur d'Alene Extension Mines Co., which will attempt deeper development. The old company shipped some ore from surface workings. The property is near the Richmond and Monitor mines, both early-day producers.

★Sunset Minerals, Inc., a Seattle corporation, has purchased the Liberal King property, in the Pine Creek section, and since last October has spent $100,000 building and equipping a modern 100-ton flotation mill and in equipping the mine for production. The new company has added mucking machines and electric haulage to the mine equipment and has unwatered the workings to the 600-ft. level. The property is opened by a haulage tunnel 4,000 ft. long and a shaft 1,000 ft. below the tunnel level. Mining operations are to be confined temporarily to the ground above the 600 level, where the company states it has ore blocked out in three veins, in one of which the predominating mineral is zinc, in another lead, and the third, copper. No production has previously been made, although the old company mined and stockpiled a large tonnage of low grade zinc-lead ore from the 1,000-ft. level in the shaft. O. Bardhal, a prominent contractor of Seattle, is president of Sunset Minerals, Inc., Livingston Greenwood, vice-president, and J. M. McGreevy, secretary. D. A. Stewart, of Kellogg, is manager; Pete Wilson, mine superintendent; and James Snyder, mill foreman.

★Sunshine Consolidated Mining Co., in which Sunshine company recently purchased a half interest, is ready to start production from the 3,100 level as soon as manpower is available, according to W. M. Yeaman, president. The company owns about 100 claims lying between the Sunshine and Bunker Hill mines. At a recent meeting of the stockholders the following officers and directors were re-elected: W. M. Yeaman, of Yakima; president; R. L. Brainard, and W. T. Simons, both of Kellogg, vice-president and secretary-treasurer; H. J. Hull, Wallace, and Grover Burrows, Yakima, directors.

★Lucky Friday Silver-Lead Mining Co. this week started shipment of 1,000 tons of mine-run ore to the Golconda milling plant. Recent diamond drilling has located another orebody close to the east-end drifting operation. The company will extend the west drift another 100 ft., all of which is expected to be in ore, judging from developments on the 500 level. The west drift on the 800

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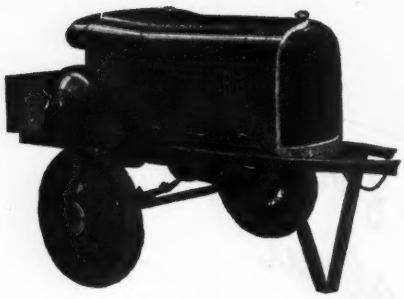

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Idaho (*continued*)

level now shows about 2 ft. of mixed quartz and high-grade ore. The company's last ore shipment netted around $15,000.

★Callahan Zinc-Lead Co. reports a net loss of $8,073 in 1943 from upkeep of its Livengood placer property, near Fairbanks, Alaska, which was closed by government order. The company is maintaining the dredge for immediate operations at the close of the war. The property and plant are mortgaged to the RFC for $1,502,000.

UTAH

Utah Copper employs Puerto Ricans—Park Utah and Silver King now work only one shift

★The Utah State Tax Commission was to conduct a hearing June 26 on protests filed by metal-mining companies against a ruling that premium payments from the federal government should be included in figuring net proceeds for property tax assessment purposes and for payment of mine occupation tax.

★Two hundred native Puerto Ricans brought to Utah from the West Indian island by Utah Copper Co. are working as track laborers at the company's big open-cut mine at Bingham. The newcomers live in rooming houses operated by the company near the mine. D. D. Moffat, company president and general manager, said the Puerto Ricans are relieving in part a severe manpower shortage which forced two cuts in production in recent months.

★In the May issue of *E.&M.J.* it was reported in the Utah news column that the Horn Silver mine, near Milford, Utah, was being reopened by the Miller and Clemson partnership, owners of the Eagle-Shawmut mine, Chinese Camp, Calif., and operators of the Penn mine, Campo Seco, Calif. Mr. Clemson informs us that the partnership is not connected in any way with the Horn Silver enterprise, but as an ndividual he is acting as business manager for Metal Producers, Inc., who are leasing the Horn Silver and King David mines.

★Utah Potash Co., of Los Angeles, has awarded a contract to Mack Drilling Co. to drill a salt, magnesium, and potash exploration well on the Seven Mile structure, 10 miles west of Moab, Utah. Robert B. Moran is in general charge for the Utah Potash Co.

★Negotiations between officials of Utah metal mines and representatives of district Union No. 2, International Union of Mine, Mill & Smelter Workers, on a new contract following the contract which expires July 1, were opened June 19 at the State Capitol. Wage schedules for the 1943 contract have not yet been announced. The non-ferrous Metals Commission awarded workers a 25c per shift increase. Both the operators and union officers appealed this to the NLRB, which has not yet announced a decision.

★Because of a serious shortage of miners at both Park Utah Consolidated Mines Co. and Silver King Coalition Mines Co. properties, Park City, the two mines went on a one-shift basis effective June 12. Previously both mines had worked two eight-hour shifts. Mearle G. Heitzman, manager of operations at Silver King, said the manpower situation had been deteriorating steadily, so the one-shift was decided upon to utilize best available men. Each mine needs more than 100 men, he said.

★Approximately 75 men employed at the Silver Hill section of the Silver King Coalition Mines Co., Park City, walked out for two shifts on May 26 and 27. The dispute arose when a man employed only a few hours a day as skip tender refused to serve also as "powder monkey" distributing powder to the men on the shift. Eldred M. Royle, chairman, State Industrial Commission, conducted a hearing after the men had gone back to work upon urging of union officials. At the hearing, union representatives agreed that the employee could reasonably serve both as skip tender and powder monkey. The company, in turn, agreed to desist from a practice of laying men off several days as a disciplinary measure, without first giving 24 hours' notice, so that grievance committee could investigate the circumstances.

WASHINGTON

Mining group asks support for bimetallism—Wage increase granted at Tacoma smelter

★W. N. Farquhar, of the Mead reduction plant of Aluminum Company of America, told a committee in Spokane, which was discussing the manpower situation, that in spite of difficulties production has not ceased at that plant. He said men were working long hours—sometimes 112 hours a week—to keep up the company's production record. One man, he said, worked 56 hours straight. He and J. P. Haight, of the same company, agreed the light-metals plants are likely to remain operating in Spokane. The Mead aluminum plant in May celebrated its second production birthday. E. B. Parker, light-metals project engineer of Washington State College, said in the same week in Spokane that 32 concerns, including the Army, the Navy, railroads, and Spokane industrial units, are conducting experiments in the use of light metals. They have greatly accelerated interest in the use of aluminum and magnesium for industrial purposes, he said. Among the possible uses he mentioned were

magnesium brake shoes, non-magnetic instrument cases, a reel to pick up low-growing farm crops, light-weight buckets and ladders for scaling apple trees, dust-control equipment for flour mills, operating tables for animal surgery, heater parts for internal-combustion engines, and trailer bunks and hooks for docking logs.

★A 52-car train of aluminum sheet for invasion bombers was shipped from Trentwood May 16. The load, it was said, would be sufficient to build 225 planes. It was larger by five cars than any previous trainload of this material from this plant. In one week one crew cast 30 rolling ingots in an eight-hour shift, or enough aluminum for six bombers, which was a record for the plant's 18 months of operation.

★Northwest Mining Association and the Mining Bureau of the Spokane Chamber of Commerce have endorsed the statement of F. H. Brownell, chairman of the board of American Smelting & Refining Co., who has declared there is not sufficient gold in the world for a gold standard and that it must be supplemented by silver. Therefore the Spokane organizations have renewed their demand for bi-metallism, and have appointed a committee consisting of Leon Starmont, Roger O. Oscarson, C. O. Dunlop, and Frank Lilly to submit resolutions to the International Monetary Conference. Mr. Lilly is the reelected president of the Hard Money Association of America. The Spokane organizations call attention to the fact that the United States Chamber of Commerce is on record endorsing bimetallism. The matter was once presented to the Chamber by Eric Johnston, since elected president of the Chamber.

★A wage increase of 2c. an hour for common laborers and 4c. an hour for operators and maintenance men at the Tacoma smelter of American Smelting & Refining Co. has been ordered by the Nonferrous Metals Commission of the National War Labor Board. The increases will be retroactive to July 1, 1943.

★Three mining companies in Washington declared dividends in June. Howe Sound Co., operating in the Cascades, paid 50c. a share June 30 to stock of record June 23. Grandview Mines Co. paid on July 15 1c. a share to stock of record June 20. The amount was $30,000, the same as the company paid last year. Pend Oreille Mines & Metals Co., at a meeting held on June 24, voted a dividend of 6c. a share, amounting to $97,938, to be paid July 28. The company has paid this same amount in each of the three previous years.

★Gratifying results were attained by Metaline Mining & Leasing Co. in 1943, says H. Louis Schermerhorn, of Spokane, president, in the company's annual report. In the year the company mined 46,322.23 tons of milling ore, from which 3,882.32 tons of zinc and lead concentrates was produced.

FEEDING

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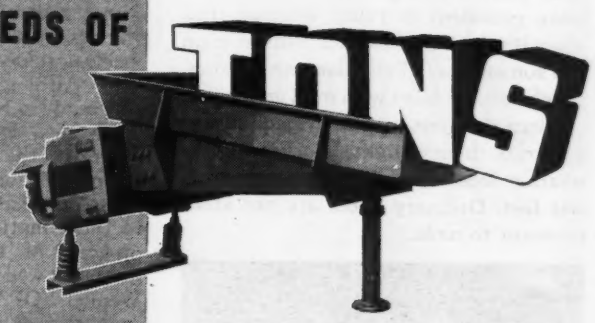

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What's New IN SAFETY

NEWS ABOUT SAFETY EQUIPMENT AND METHODS

The season for Foot Puncture Wounds

Why should foot puncture wounds be more prevalent in rainy weather than when it's dry? Boards with nails in them will sometimes fall off piles into hollows, which become filled with mud and water.

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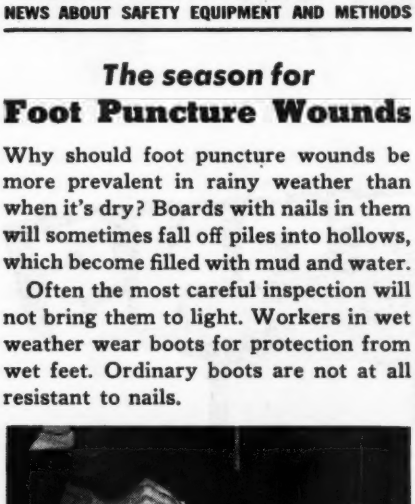

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Vacation Tips

Got any snakes, poison oak or ivy in the hills in your bailiwick? How about taking along the Venex kit? It's the most effective first aid treatment for snake bites. Help put your mind at ease, too. This kit has been used for years by public utilities and various government agencies.

I-V Tox or Otox will immunize against contracting poison ivy or oak. It may be taken orally in a third of a glass of water. Two vials are usually enough to immunize.

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EVERYTHING BULLARD IN SAFETY

TRI-STATE

Manpower shortage more acute, but output is maintained—New Joplin strike developed

★June found the Tri-State mining industry struggling to hold a weekly production of about 7,000 tons of zinc concentrates, with the scarcity of efficient labor getting definitely worse. During the first week of the month, James Douglas, director of the WPB zinc division, visited the district and spent several days conferring with officials of mining companies and inspecting some of their operating properties. Although he observed closely and made a careful study of operating conditions, Douglas said little on the future of the premium-price plan and the production-quota system, except to point out that any action with respect to these matters would depend on the progress of the war. Douglas' visit was followed by that of Clifford A. Wendel, OPA mining engineer, who spent a week in the district.

★Stotts City Mining Co. is sinking a new shaft on the Bennett lease of St. Louis Smelting & Refining Co. in the Waco area. A new derrick and hopper, similar to the original built on the lease by the St. Louis Co., and being operated by the Stotts City Co., has been completed over the shaft site. When the shaft is completed to around the 250-ft. level, and mining operations get under way, ore will be trucked to the St. Louis No. 9 mill, a mile north. Both the St. Louis mill and the Bennett lease are on the Kansas side of the Missouri-Kansas state line, which bisects the Waco mining field. Kenneth Childress is in charge of the Stotts City operations, and H. H. Utley, of Baxter Springs, is district agent for the St. Louis Co.

★J. & V. Mining Co. is developing a good lead mine on the Freer land, a half mile southwest of the Missouri Chemical Co.'s new plant east of Duenweg. The company has completed the sinking of a new shaft after putting down 13 drill holes on the mining tract. Drilling was done on virgin ground and disclosed a run of lead ore crossing an area of several acres. The shaft was put down to the 83-ft. level, and two 7-ft. drifts are being driven on that level to the east and west. The ore is found in a sheet, three or four inches thick at the top, and also in chunks weighing several pounds, which are disseminated in the ore-bearing ground face of 5 ft. in height. The ore will average between 15 and 20 percent in lead recovery values, according to Clarence H. Kline, who is in charge of operations. Among those associated in the company are C. E. Niday and John Jones, of Picher.

★Little Pat Mining Co. is working a rich zinc mine developed on 40-acre tract leased from Missouri Lead & Zinc Co. in the southeast part of Joplin. The rich mine was blocked out several weeks ago by drilling. W. D. Brittain, George Minshall, and Harold Andrews, all of Joplin, are owners and operators. Five holes were put down originally, and the ore was encountered from a depth of 33 to 62 ft. Cuttings assayed as high as 59.70 percent zinc and 0.64 percent lead, Brittain reported. In developing the mine, a shaft has been put down to the 45-ft. level, and an 11-ft. heading has been started out from the bottom of the shaft toward the north. Charles Roberts, veteran prospector, described the shallow orebody as "another Joplin jack bin better than the old Bumblebee." It was reported that from the first milling of 164 tons over the Playter custom mill, at Waco, a 60-ton car of zinc concentrates was produced.

★Flower Girl Mining Co. has reopened and deepened a shaft on the Drake land, which was subleased from the J. P. Mining Co., a mile southeast of Joplin. The shaft, which was sunk a few years ago by "Red" Johnson and associates, was deepened 12 ft. to the 118-ft. level. A good run of lead ore is expected to be opened up on this level. Associated in the company are Jesse Duff, James Creech, and Park Haggart, all of Joplin.

ARKANSAS

Confederate Home bauxite project dropped—Prospects better in zinc district

★Baroid Sales Division, National Lead Co., has contracted with Western-Knapp Engineering Co., San Francisco, Calif., for the design and reconstruction of the Company's Baroid plant near Malvern. Eric Freitag is project superintendent for Western-Knapp, and John L. Regh is purchasing agent.

★The question of the development of the bauxite deposits under the Confederate Home, near Little Rock, which has been a subject of energetic discussion for nearly two years, has finally been decided in the negative, leaving the residents of the home, as Joe Hardin, head of the Arkansas Bauxite Commission, puts it, "virtually isolated on an island, surrounded by excavations as deep as 100 ft. and mounds 50 to 100 ft. high." These excavations and mounds were made in the course of exploration of the deposits underlying the home, which the State undertook at the request of Metals Reserve Co. Later, as a result of the elimination of the submarine threat to bauxite shipments from South America, the project was dropped. The State is now asking $100,000 as compensation for the expense incurred in exploring the deposit and possibly for rehabilitating the area surrounding the home.

★Hope of bauxite producers in Arkansas that there might be some demand in

Canada for their ore was blasted recently by an Associated Press dispatch which quoted the U. S. Bureau of Mines as saying that Canadian needs could be met by South American shipments of bauxite. The announcement went on to outline the reasons for recent curtailment of Arkansas's production, which include: existence of bauxite stockpiles equal to a year's consumption at present rates, and recent cuts in aluminum production that also decrease the monthly demand for bauxite by 110,000 tons between the last quarter of 1943 and the first quarter of 1944. Production in the first quarter of 1944 was 816,426 short tons; in the last quarter of 1943 it was 1,711,228 tons.

★Wet weather in May slowed down production in the Batesville-Cushman manganese field, but in early June the heavy rains stopped, and operations are gaining. Low grade is still going to the blast furnaces, and most of the high grade is being purchased by the Metals Reserve buying depot at Batesville. Production in May in the field ran approximately 1,024 tons of low grade and 605 tons of high grade, a total of 1,629 tons.

★The first shipment of ore from the Metals Reserve stock-piles in the field went to Woodward Iron Co., of Woodward, Ala., in May. It consisted of 2,000 tons of low grade, purchased from local operators when the buying depots were first opened. They have one large stockpile at Cushman and another at Pfeiffer. The exact tonnage has never been released.

★Major Ruggles, in charge of the Metals Reserve buying depot at Batesville, reports some shipments of manganese by truck coming in from Norman, Ark., in the Mena district, in the southwestern part of the State. The last shipment was brought in several days ago by Mrs. M. C. Stinger, of Norman. She also brought in several samples of copper ore for analysis.

★Standard Manganese & Mining Corp., operating the Blake property, four miles east of Cushman, started its washing and concentrating plant early in June. Operations are in charge of M. N. Glumicich, of Batesville. Will Rinehart is operating engineer, and Robert Tugwell, foreman. The plant will handle approximately 400 tons of crude a day. Equipment consists of a 30-ft. log washer, and rougher and cleaner jigs, powered with a diesel engine. Most of the ore is high grade, some of it running as high as 63 percent.

★Stanley Bourne and Ernest Stroud, of Batesville, who are operating the Austin property, which produces pyrolusite ore, have been trying for the last two months to get a power shovel for pit mining. They will start operations again as soon as they can buy one of these machines.

★Lou Peterson, of Cushman, operating the Turner property, near Cushman, has his washing plant under construction. He expects to have it going sometime this summer

★Hall Mountain Mining Co., J. C.

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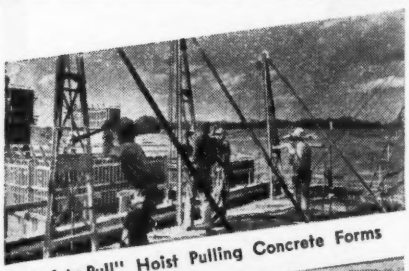

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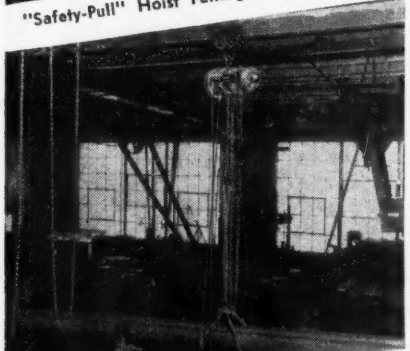

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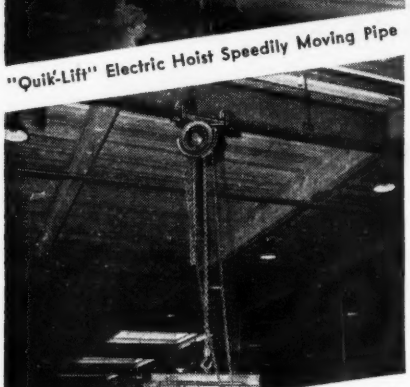

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Arkansas (*Continued*)

Jones, of Yellville, in charge of operations, started construction of its mill in June. In its Wickersham tunnel it recently encountered a rich run of carbonate of zinc ore, which with other ore faces encountered, will supply plenty of ore to keep the plant in operation.

★W. M. Jones, of Staten Island, N. Y., has purchased a tract of land on Section 7, north of Yellville, and is doing prospect work in an old tunnel. He has encountered some showings of ore.

★S. & G., Inc., operating the Hurricane mine, in Searcy County, near Pindall, have their new mill nearly completed and will probably be in operation early this summer. J. C. Shepherd, of Harrison, is in charge of operations.

★Advance Mining & Engineering Corp., operating the North Star mine, near Harrison, John Stone, of Harrison, in charge of operations, has completed its dry-milling plant and is making test runs. Its shaft is down to 96 ft., and the company reports about 20,000 tons of zinc sulphide ore blocked out. Test runs are said to show 63.50 percent metallic zinc in the company's concentrates and 2.75 in its tailings. The company runs its ore through a jaw crusher and an impactor, which reduces it to between $\frac{1}{4}$ in. and 65 mesh. It is then properly sized on sizing screens and run over air tables. The operators state that their tailing loss can be overcome by making the proper table adjustments.

MICHIGAN

Isle Royale pays first dividend since 1937—Iroquois showing improves below 18th level

★The dividend of 50c per share on the capital stock of Isle Royale Copper Co., payable July 21 to stockholders of record June 26, is the first return to shareholders since the reopening of the mine in the spring of 1937. A total of $75,000 will be paid. The last dividend was paid 14 years ago on Feb. 28, 1930. The directors also voted to purchase $75,000 worth of Fifth War Loan bonds. Isle Royale mine was closed in 1932 at the depth of the depression. In 1937, when it was reopened, about $400,000 was expended in unwatering the shafts and rehabilitating the property, mill, and railroad. To provide working capital, three assessments of 50c per share each were levied during 1938 and 1939, or a total of $225,000. Production was started in July, 1938, and since that time 40,300,000 lb. of copper has been mined. Since reopening, the company has expended $5,713,413 on its operations, of which $3,299,430 was for payrolls. Isle Royale receives a premium price for its copper from the government, inasmuch as present labor rates and material costs require a considerably higher price than the current level of 12c per pound.

★Production of copper from the new Central exploratory shaft of Calumet & Hecla Consolidated Copper Co., in Keweenaw County, recently passed the million-pound mark. The fissure vein is now mined on the 300- and 350-ft. levels. A small area adjacent to the fissure also is being mined, and considerable mass copper is being found. One of the principal objectives in this shaft is to discover any mineralization of importance on the lodes intersected by the fissure, but so far none has been found. Only a small crew of men is employed, on a three-shift basis. All the copper rock is hauled by truck to a loading platform at Allouez.

★In the new Iroquois shaft of Calumet & Hecla, the copper showing is better on the 18th level than in the upper reaches. This bears out the diamond-drilling results, as the best values were revealed at depth. Drifting is being pushed on the 18th to explore this zone.

★At the Calumet & Hecla smelter, the foundation for the new No. 22 furnace has been poured, and work on the steel and brick is proceeding. Many innovations in design have been incorporated in the new furnace, which will be used a a much-needed spare for the No. 21 unit.

★In cooperation with the Michigan Conservation Commission, the Michigan College of Mining and Technology is continuing geological investigations in the western end of the Marquette iron district with the hope of discovering new deposits of iron ore, tungsten, beryl, molybdenum, and other strategic war minerals.

IRON COUNTRY

Embarrass mine now shipping ore—Cleveland-Cliffs improves Cambria-Jackson mine plant

★Pickands, Mather & Co. has begun shipping iron ore from the Embarrass iron mine, at Biwabik, Minn., on the Mesabi Range. Winston-Morrison-Utah is continuing its contract of stripping at the mine, and Pickands-Mather is loading out iron ore. The work of preparing the Embarrass mine for production has been a large undertaking, involving the dewatering of Syracuse Lake, mine stripping, and a large diversion ditch. The development of the Embarrass property required 19,000,000 cu. yd. of stripping in the original estimates to make available 24,000,000 tons of iron ore known to be present in the property.

★Pickands, Mather & Co. operated last year at 12 iron mines in Minnesota and continues this year to operate the same number. On the Mesabi Range the company is producing from

the Embarrass, Biwabik, Corsica, Dunwoody, Albany, Scranton, Mahoning, Bennett, and Danube. On the Cuyuna Range it is operating the Mahnomen and the Sagamore, and on the Vermilion Range, the Zenith mine.

★According to Lake Superior Iron Ore Association reports, 12,114,211 gross tons of iron ore was loaded into Great Lakes' freighters last month, the second largest total in history. The record was set in May, 1942, when 12,677,356 tons was poured into freighters. The total for this year to June 1 is 4,472,801 tons above the 1943 figures for the same period.

★After operating a diamond drill on the Commonwealth iron-ore exploration near Florence, Mich., for several months, Pickands, Mather & Co. has stopped this work and moved the drill off the property. Some of the holes put down were in the vicinity of the old Davidson and Commonwealth pits.

★One of the largest admiralty suits in Great Lakes' shipping was concluded when Federal Judge Arthur J. Tuttle granted $495,000 award to the Kinsman Transit Co., of Cleveland, for loss of the steamer "George M. Humphrey." This vessel was sunk off Mackinaw Point on June 15, 1943, after colliding with the "D. M. Clemson," of the Pittsburg Steamship Co. When the "Humphrey" sank, it carried a cargo of 13,772 gross tons of iron ore owned by Oliver Iron Mining Co., of Duluth, whose claim was set at $49,027.97, to be paid equally by the Kinsman and the Pittsburg companies. The value of the "Humphrey" was set at $1,088,000.

★Extensive plans were made last spring to rebuild and reopen the Greenwood iron furnace, near Ishpeming, Mich., to celebrate the centennial of iron-ore discovery on the Marquette Range. Recently the federal government requested Inland Steel Co. to postpone this work because of present scarcity of labor and supplies. The centennial celebration and pageant will be held July 4 as scheduled, but no local furnace will be operated as part of the program.

★Since taking over the Cambria-Jackson mine from Republic Steel Co. on June 1, 1943, Cleveland-Cliffs Iron Co. has made several improvements to surface and underground equipment. The steel shafthouse, built in 1910, was in such poor condition that more than one-third of the structural members, as well as the bins and dump plates, had to be replaced. This work was done during spare time to eliminate delay in hoisting ore. The stockpile ground was enlarged to secure greater storage space. The changehouse was brought up to date and rehabilitated to accommodate more men. This required a new heating system and sewage-disposal plant. Underground, several new slusher contracts were started, with new equipment, and plans are under way to increase the efficiency of the pumping stations. John Trosvig is superintendent.

AT 150°C

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Iron Country (*Continued*)

★All possible speed is being made on the new Cary mine shaft, at Hurley, Wis. Before the 66-in. borehole had reached the 2,500-ft. level, a raise was extended upward from the 31st level almost 100 ft. It was equipped with chutes to handle the muck produced as the borehole is stripped to full shaft size. A new 3,000 c.f.m. Sullivan angle-compound air compressor equipped with a 600 hp. motor is being installed in a new engine house, and a new Nordberg hoist will soon be installed to operate the 8-ton skips. Power will be secured from the Lake Superior District Power Co., of Ashland, Wis.

★While a steel shafthouse at the Francis mine near Gwinn, Mich., was being razed by dynamiting the supporting legs, a piece of steel sailed over 600 ft. through the air and cut four fingers off the right hand of the local dentist who had been curious enough to drive out to see the shafthouse fall. Recently, he sued Cleveland-Cliffs Iron Co. for $50,000, alleging carelessness on the part of the company in failing to keep spectators at sufficient distance from the blast, in using too much dynamite in the charge, and in providing insufficient protection for the blast. On June 15 the jury in the federal court at Marquette, Mich., awarded him damages totaling $27,774.

ALASKA

Several gold placers now in operation—U.S.B.M. to continue exploration work.

★With all officers' salaries eliminated and other expenses reduced, the Independence gold mine, at Wasilla, has again been put in operation by Alaska-Pacific Consolidated Mining Co. The government permits the employment of 10 men, who began clearing up the mine approaches and doing preliminary work in May. Men over military age and other men not needed in essential industries are employed. It is planned to limit operations to repair and development work. In doing this it is expected enough bullion will be produced to defray expenses. The mine was closed Aug. 8, 1943, by the WPB. John Hoveland is mine superintendent, and Roy E. Lynch, mill superintendent. The task of cleaning up for operations was difficult because of the heavy snowfall last winter. The present board of directors consists of Henry Waechter, president; August Buschmann, vice president; Clay C. Harrison, secretary; F. R. Chambers, C. W. Lothrop, Thad R. Perry, and Walter W. Stoll.

★Several Alaskan gold placers are in operation, most of them with crews limited to 10 men. Arctic Circle Exploration, Ltd., in the Candle district, is planning operations this season and will be permitted to use 50 men if they are among non-essential war workers. Old men and some natives will be employed. James F. Robbins is general manager.

★Goodnews Bay Mining Co. is working about 50 men. This company's product is platinum, classified as an essential metal.

★After spending much of the winter at Tenakee Hot Springs, Walter Fisher has returned to Grant Creek, where he expects to work this season with two men the same as he did last year.

★Norman Ebbley, Jr., of the U. S. Bureau of Mines, will have three or four other engineers working with him this year in doing exploration work, according to a statement which he made when in Fairbanks. What the Bureau particularly seeks are showings of quartz crystals, optical calcite, mica, bismuth, nickel, platinum, and asbestos. Bruce Thomas and Harold Pierce are two of the engineers who will be with him. The group will also study showings of copper, zinc, lead, tungsten, chromium, and antimony if they appear to have commercial possibilities. Among districts in which they will work are the Bonnifield area, Forty Mile, Goodpaster, Nabesna, Chisana, Mount McKinley, and Copper River regions. Much of their work will be diamond drilling and trenching.

★Stephen P. Holt and Wilford Wright, of the U. S. Bureau of Mines, have been in Ketchikan after exploring the Tolstoi Bay area for iron-ore deposits which might be used if a postwar steel plant is established in the Pacific Northwest.

★Awe Mining Co., Pete Miscovich, and the Matheson dredge are expected to work one shift this season. Patrick Savage, a professional placer miner, of Flat, says there is little prospect of much placer mining this summer.

★In the Senate bill which provides $28,300,955 for the Bureau of Mines, the U. S. Geological Survey is given $1,075,000 for investigation of mineral resources in Alaska. Senator Pat McCarran, of Nevada, has stated that portions of the $6,000,000 to investigate raw material resources for a proposed steel production in the Pacific Northwest, will be spent in locating and exploring mineral deposits suitable for steel manufacturing. Alaska expects to be able to offer ore and water power resources suitable for these purposes.

CANADA

Collective bargaining order may unionize engineers—CIO wins Noranda—Pinchi Lake closed

★A meeting was held in Ottawa on April 14, 1944, by representatives of 14 Canadian engineering organizations for the purpose of considering Order in

Council 1003, which establishes collective bargaining as Dominion law. Though the effect of this order, which was adopted without an expression of opinion by the engineering profession, is considered to be temporary, it is regarded as a serious threat to all professional workers. The Canadian Institute of Mining and Metallurgy has circularized members with a ballot that is intended to indicate preference for one of three lines of action. The alternatives provide for: (1) Professional associations and technical institutes to be excluded from collective bargaining and to improve the economic position of engineers and engineers-in-training. (2) Each Province to have a separate agency to function in bargaining collectively on behalf of all engineers. (3) Engineers to be excluded from the operation of Order in Council 1003, with provision for setting up individual technical societies in each Province.

★On June 13, 1944, a decisive victory was won at the Noranda mine by Local No. 688 of the Mine, Mill and Smelter Workers Union for certification as the bargaining agency for employees. The vote was the first to be taken in a Quebec mining camp and was under direction of the Labor Department at Ottawa a week after the application had been approved by the National Wartime Labor Relations Board, following a hearing of representatives of both the union and Noranda Mines, Ltd. Arrangements were made for the voting by Frank Lafortune after he had inspected the pay lists, showing 1,333 out of the total 1,906 company workers to be eligible to vote. Out of this number, 1,176 ballots were cast and only 94 were opposed to the question: "Do you authorize the Union to elect or appoint bargaining representatives on your behalf?" The Wartime Labor Relations Board operates under Order in Council 1003, which defines an employee as one who is engaged for skilled or unskilled manual, technical, or clerical work, excepting only those serving in a confidential capacity or who have authority to employ or discharge workers, but at Noranda the limitations were extended to include "all technicians, workers in laboratories, members of the clerical staff, guards, and part-time workers." Of the 573 employees who were excluded from voting, 255 are with the armed forces.

★At a meeting held in Rouyn on May 22, a group of local mine managers took part in a discussion led by J. C. Houston, manager of the Senator-Rouyn gold mine. Harry E. Sparks, manager of the O'Brien mine, expressed the opinion that misguided unionism was the greatest single danger to the future of mining in northwestern Quebec. He believed that employees were in a position to secure more privileges through negotiations with the mine management direct or through a union that was Canadian rather than of foreign origin. George W. Robinson, manager of the Stadacona Rouyn mine, pointed out that unionism made it inevitable that costs would increase in gold mining. In his opinion,

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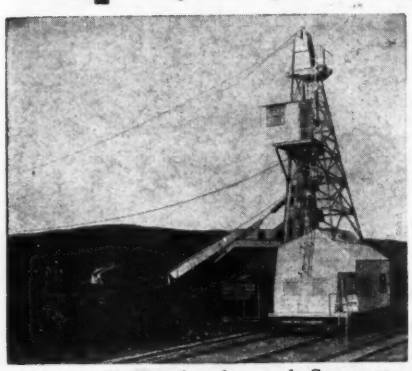

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Canada (*Continued*)

gold mining would forge ahead of base metal mining after the war, leading to a tremendous boom.

★Recent balloting by employees of Toburn Gold Mines, Kirkland Lake, and Little Long Lac Gold Mines resulted in majorities in favor of the Independent Miners' Union as opposed to the CIO. At both mines there were threats by minority groups to quit work in order to transfer to other neighboring mines. Under National Selective Service, miners are restrained from leaving an unessential gold property voluntarily, on the penalty of losing compensation that results in their movement to war-essential work. Failure to comply with Selective Service orders leaves a man liable to arrest and prosecution. In transferring men to essential industry, married men who are forcibly moved from one job to another with lower pay will receive compensation for the difference.

QUEBEC

★New Ribago Mines, holding 12 claims in Rouyn and Beauchastel townships, has been organized as Ribago-Rouyn Mines. An option agreement has been completed, on which $5,000 has been paid into the treasury and payments amounting to $165,500 provided for. Diamond drilling and surface work are to start early this summer. A substantial holding in New Ribago is reported for Halcrow Swaze Mining Co. by the president, Horace F. Strong, and Halcrow offers rights for increasing its equity in Ribago-Rouyn.

★The new 250-ton mill of Aldermac Copper Corp. is scheduled to start operating about July 1, according to an announcement by the vice president and managing director, A. A. MacKay. Operation of the mine and concentrator, 12 miles west of Noranda, came to an end last August with the exhaustion of ore reserves, and development was started at Moulton Hill, Ascot Township, four miles from Sherbrooke. Copper, lead, and zinc concentrates, and a pyrite concentrate, are to be produced for shipment to the United States. The ore carries gold and silver. A station is being cut at the third level and the shaft is being deepened for the fourth level at 500 ft.

★M. A. Thomson, president of New Calumet Mines, has announced plans for increasing monthly output from the mine, on Calumet Island, in the Ottawa Valley, from $140,000 to $175,000 a month. Mill capacity is being advanced from the present 475-ton rate to 600 tons a day. A series of ore passes leading to a loading pocket below the 600-ft. level is being installed, and skips are replacing the cage used for hoisting ore cars. It now appears that gold content is increasing below the 300-ft. level, in association with the galena. At a depth of 400-ft. it is reported the ore averages 0.19 oz. gold per ton, 2 percent zinc, and 2 percent lead.

ONTARIO

★Sylvanite Gold Mines reports progress in sinking the inside shaft, although men are available to work only one shift a day. A station has been cut at the 5,100-ft. level and sinking is being continued to the objective at 5,500 ft. The shaft starts at 3,150 ft. and is similar in its capacity to the main shaft, allowing for expansion to lower horizons in the postwar period. Diamond-drill exploration from the adjoining Wright-Hargreaves property indicates the main north ore zone persisting below the 5,500-ft. horizon. Ken C. Gray is general manager.

★Financing has been arranged to reopen the property of Hoyle Gold Mines, east of Pamour Porcupine. Thayer Lindsley, president, has announced plans for extensive exploratory and development work with a view to blocking out ore sufficient to justify installing a mill of 1,000-ton capacity, to replace the 600-ton plant destroyed by fire. The large low-grade orebodies are believed to offer promise of profitable production in the postwar period.

★In the fiscal year ended March 31, 1944, McIntye Porcupine Mines succeeded in increasing ore-reserve tonnage, although the grade was down from $12.65 to $12.21. Recovery per ton increased from $10.85 to $11.16 per ton during the year, the labor shortage resulting in a reduced scale of operations with output down to $7,305,804 for the year. The president, J. P. Bickell, in his annual report emphasised the serious restrictions on development work imposed by the increasing shortage of men. McIntyre Research owns patent rights covering the use of aluminum dust for the treatment and prevention of silicosis, and licenses have been issued to many plants both in Canada and the United States where silicosis is a hazard. Most of the quartz mines in Canada are making use of this process, with 6,000 men receiving daily treatment. As a first step in the use of these methods in the United States, 500 men are under regular treatment.

★The unwatering of Steep Rock Lake was about 87 percent complete on June 1 and much of the B orebody is exposed to view. A road has already been built from the exposed orebody to the crushing plant, and if the crushing machinery can be obtained ahead of time, the plant may be in production sooner than was expected. Meanwhile, pumping operations continue on schedule.

BRITISH COLUMBIA

★The Mining Association of British Columbia has recently made a further representation to Ottawa with a view

to securing some relief for the critical labor shortage obtaining in the gold and copper mines of the Province. Several of those mines forced to close for this reason are not likely to reopen and, with one exception, none of those remaining in operation has been able to maintain development to equalize depletion. Unless this condition is immediately relieved, a further disintegration of the industry is inevitable, and its effective functioning in the postwar period will be precluded.

★All work has been suspended at the Tyee copper-zinc-gold mine, Victoria mining division, by Twin "J" Mines, Ltd., whose contract was recently cancelled by Wartime Metals Corp. Efforts of the management to obtain contracts for the sale of copper and zinc concentrates to other purchasers have been productive only of offers at which commercial operation cannot be maintained. Income from royalties during the brief period of production has been sufficient to enable the Twin "J" company to repay all advances made by Jason Mines, Ltd., Ontario gold operator.

★Production of Pioneer Gold Mines of B. C., Ltd., Lillooet mining division, during the fiscal year ended March 31, 1944, was 8,953 oz. gold and 1,582 oz. silver, valued at $344,914, from 20,993 tons, averaging 0.439 oz. gold per ton. After all costs and provision of $24,187 for depreciation, $17,355 for depletion, and $44,280 for exploration and prospecting, net operating loss for the year was $50,236. Earned surplus was reduced to $353,565 as a result of an impost of $29,703 for additional income and excess-profits taxes dating back over the past four years. Development work was greatly restricted, consisting only of 1,398 ft. of drifting on the "27" vein and the driving of two raises on the same vein between the 21st and 20th levels. Diamond drilling aggregated 9,823 ft. As of March 31, 1944, ore reserves were estimated at 201,487 tons, averaging 0.428 oz. gold per ton. Of this, 44,363 tons is broken and ready for milling. The Eagle and Eagle Fraction mineral claims, adjoining the Pioneer and Countless claims, were purchased for $75,000. This ground has become increasingly important as development in this direction on the "27" vein approached the vicinity. Exploration of a promising cinnabar property north of the Bridge River resulted in indications of a tonnage too small to have economic possibilities. A block of claims in the Pinchi Lake area was thoroughly prospected. Zones of low-grade mineralization were found, but none was considered commercial. An option has been acquired on a new discovery in the Hedley district. Surface work has extended the length of the original showing, but there is no indication as yet of a commercial orebody. Pioneer has prospected, in conjunction with Northern Canada Mines, Ltd., in the Snow Lake district of Manitoba. Two of three showings have been abandoned, but the third is described as deserving further attention.

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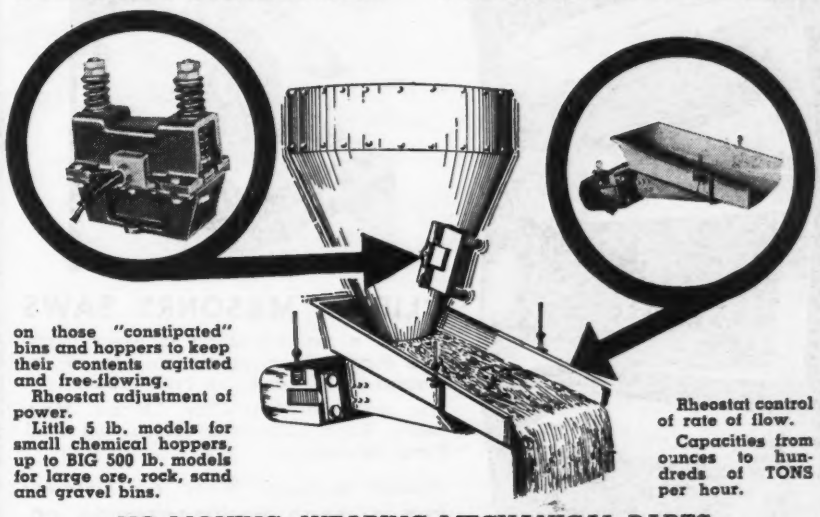

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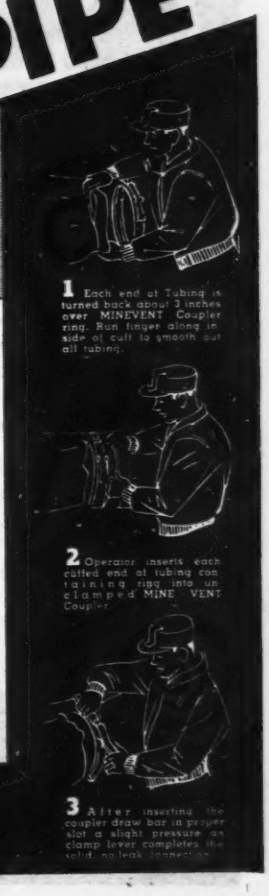

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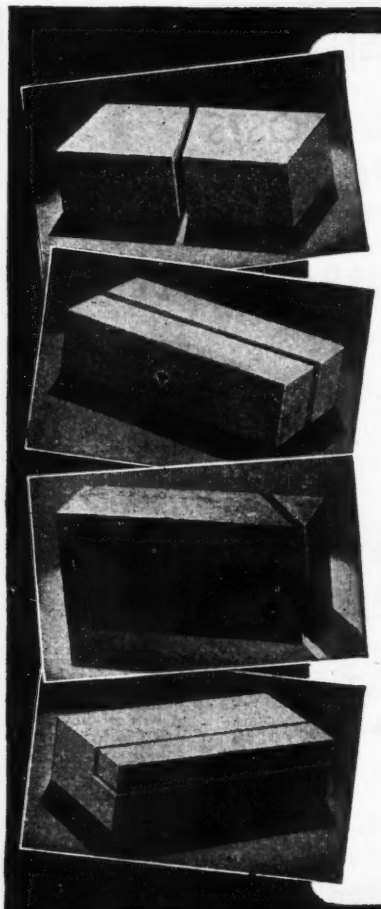

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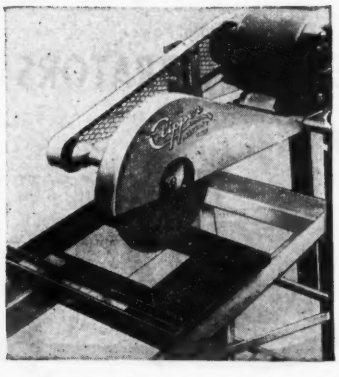

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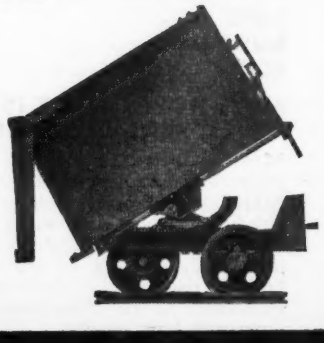

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Canada *(Continued)*

★With more than a year's stockpile of quicksilver on hand, The Consolidated Mining & Smelting Co. of Canada, Ltd., has announced the suspension of production at the Pinchi Lake mercury mine. During 1943, the Pinchi Lake property produced mercury valued at $4,157,504. After mining cost of $1,038,784 and milling cost of $890,174, a gross operating profit of $2,219,636 was obtained. Provision of $58,741 for B. C. Mineral Tax, $578,718 for depreciation, and $11,071 for depletion, resulted in a net operating profit of $1,571,104.

YUKON TERRITORY

★The official opening of the Canol refinery at Whitehorse, April 30, was a gala event for the Far North province of Yukon. Three thousand spectators, many coming for hundreds of miles, witnessed the historic event. Canadian and American officials heard the formal address of welcome by Capt. George Black, Member of Parliament. It was reported that 42,000 civilians and soldiers worked on this job, which is already bringing oil by pipeline from Norman Wells, on Mackenzie River, to the refinery at Whitehorse and thence to Fairbanks, Watson Lake, and Skagway. The project has been described as one of the biggest construction ventures since the Panama Canal.

★Numaleke Mines, Ltd., of Toronto, has taken an option on 20 miles of placer ground on Scroggie Creek, tributary to the Yukon. F. C. L. Price, the company's manager, has arrived at Dawson to prospect the ground, and will be assisted by George McRae, formerly with Yukon Consolidated, and Fred Cook, of Saskatchewan.

PERU

El Dorado now producing copper in Ancash—Julcani expands —New tungsten prices halt small operators

★Compania Minera El Dorado started operations in early April. The El Dorado mine, about 50 miles inland from the port of Supe, in the Department of Ancash, was purchased about a year ago by the present concern. The Office of Economic Warfare gave the company financial aid for the development of the mine. Now, with further help from the Banco Minero, the mine is producing high-grade ore containing about 20 percent copper and a little silver. Ore in sight is about 10,000 tons, with sizable amounts of probable ore. After hand sorting, the high-grade copper will be shipped directly to the United States.

★Sociedad Minera Suizo-Peruana Julcani has announced an increase in its capital from 3,300,000 soles ($510,000)

to 5,000,000 soles ($770,000). The company, which operates the Julcani mines, in the Department of Huancavelica, near Lircay, has been working gold, silver, lead, and tungsten ores for several years. The increase in capital will pay for the new 200-ton cyanide plant recently installed and purchased through a loan from Cerro de Pasco Copper Corp. The company has large reserves of oxidized gold ore, including 56,000 tons carrying 0.94 oz. of gold and 2 oz. of silver; it also has 77,000 tons of sulphides with 0.15 oz. of gold, 5 oz. of silver, and 5 percent lead. The cyanide plant will start operation soon, treating at first the 100,000 tons of tailings which contain 0.075 oz. of gold and 1 oz. of silver. Tungsten will not be recovered at present, because of low prices

★Metals Reserve Co. has announced the new prices for tungsten ores, showing a marked reduction which will probably make it prohibitive for the many small miners in Peru to work their mines. New prices are $16 per short-ton unit of WO_3, for ores containing 65 percent or more WO_3, decreasing to $12 per unit for ores containing 30 percent WO_3. Former top price was $22.60.

★Compania Explotadora Minera San Agustin (CEMSA) has just repaired its 100-ton flotation plant, which was damaged about a year ago by an avalanche. The plant will treat ores from the Paccha and San Agustin mines, in the Hualgayoc region, at an elevation of 12,000 ft., about 140 miles inland from the port of Pacasmayo. Reserves are said to be over 50,000 tons with 6 percent copper, 32 oz. of silver, 4.6 percent lead, 9.1 percent zinc, and 0.015 oz. of gold. The plant is designed for selective flotation, and will produce three concentrates: lead, copper, and zinc.

★The Office of Economic Warfare is at present distributing information on Iceland Spar, with the object of encouraging its production in Peru. This mineral has been found in Peru only in non-commercial quantities.

BOLIVIA

Tungsten production cut—Tin output decreases—Boom in sulphur ends abruptly

★Bolivian tungsten production, which increased from 1,081 metric tons in 1937 to 4,141 tons in 1943, seems destined to drop sharply because of termination of Metals Reserve contracts with producers outside the U. S. The contract expired June 30, 1944, and there is little likelihood of its renewal; nor is there any other buyer in sight. The U. S. Commercial Co., the FEA agency that replaced Metals Reserve in foreign trade, has offered informally to buy Bolivian tungsten ore at $16 per

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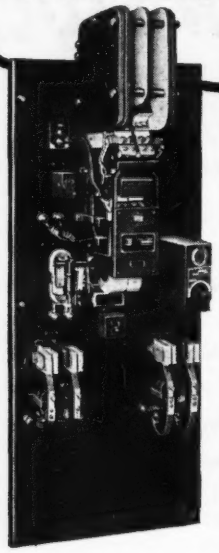

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Bolivia (*Continued*)

short-ton unit of contained WO_3, f.o.b. South American Pacific ports; the old price was $22.60. This price cut, plus advanced specifications and increased penalties, has made producers reluctant to accept this offer.

★The present tungsten situation might be compared with that of antimony about six months ago. Metals Reserve antimony contracts expired on Dec. 31, 1943, and since then all efforts to place Bolivian antimony have failed, and practically all antimony mines have shut down. At a price of $16 a unit, it is doubtful if more than a third of the tungsten mines can remain in operation.

★During the first four months of 1944, 11,349 metric tons of fine tin, in ores and concentrates, was exported; during the same period in 1943, exports amounted to 13,367. This decrease has been attributed to delays in transportation because of irregular train service during the rainy season (December to April), but the confused political situation in the country has probably been the chief source of trouble. Now that the Bolivian government has been recognized by the United States and most of its Latin-American neighbors, the internal economy of the country may be expected to operate more smoothly.

★Tin Placers Corp. is a new company that began work recently on tin-bearing placer ground near Oruro. Thus far, its production has been about 10 to 15 tons of fine tin per month, but it is reported that this output will soon be increased. The operation is mechanized.

★Sulphur mining is again declining. At the beginning of 1943, when the price of sulphur, at Antofagasta, reached an all-time high of $83 per metric ton, new equipment was installed at several properties, and production boomed. But in the latter part of 1943, the United States resumed shipping sulphur from Gulf ports to Brazil and Argentina, and the price promptly dropped to $26 per ton, leaving Bolivian sulphur producers high and dry. Production in 1943 was 7,192 metric tons. Exports now run about 300 tons monthly.

MEXICO

Settlement appears likely in mining strike—New iron and steel plant opened

★Up to the time of going to press, the general strike in Mexico's mining industry remained deadlocked, with the National Miners' Union demanding substantial wage increases, and employers steadfastly maintaining that such increases would force them out of business, unless some relief in the form of continued high metal prices could

be promised by United States metal-buying agencies. Two companies have signed agreements with the workers, however, and are at work. These are Real del Monte at Pachuca, a subsidiary of U.S.S.R. & M. Co., and El Potosi, in Chihuahua, a subsidiary of Howe Sound Co. The strike forced WPB to delay for a week allocation of common lead for July, because without customary shipments of the metal from Mexico, it would be necessary to dig deeply into the U.S. government stockpile, which would also mean substituting corroding lead for common. At the end of June, it was reported that President Camacho was at last taking a hand in the dispute, and it therefore seems likely that a settlement will soon be reached.

★An important deposit of wulfenite ($PbMoO_4$) is being opened up in northern Sonora by an American group headed by Howard H. Fields, Apdo. 182, Hermosillo, Sonora. About 200 tons of ore, said to be high in molybdenum and lead, is now awaiting shipment, and 10 to 15 tons daily is being mined.

★Blast Furnace No. 1 of Altos Ornos de Mexico, S.A., Monclova, Coahuila, was blown in recently, and it is hoped that other units of the plant will be operating before long. The new furnace was christened "Monclova" by Mrs. H. Pape, wife of the company's general manager, and was blessed by Father Alfredo F. Blanco. General Abelardo L. Rodriguez, former President of Mexico and now Governor of Sonora, is chairman of the board.

★The Dos Estrellas cooperative society has altered the optimistic tone of previous announcements and has revealed that unless the government can aid it to the extent of 500,000 pesos, work must be suspended for lack of repair parts for its machines. A shutdown would make about 5,000 men idle.

★Mercury mines in Coahuila, Gurrero, and Zacatecas, hard hit by the recent drop in the price of mercury, have been forced to release more than 5,000 employees, according to the Labor Ministry.

★The National Miners Union has chosen 600 of its members from mines, mills, and smelters throughout the country to undertake intensive studies of mining methods in the United States. The training period will last six months, and travelling costs of the men will be met by the union.

★The Bank of Mexico is reported doing a brisk business in the sale of gold tokens to hoarders at the rate of 4.20 silver pesos per gold peso. Gold coin has officially been regarded as merchandise in Mexico since the country went off a silver standard in 1931.

★Farmers of several regions in Mexico have complained to the Labor Ministry that they are suffering from a severe manpower shortage because farm workers have been attracted to mines by the high wages, shorter hours, and social benefits that farming does not afford.

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are carrying loads in all climes where off-the-highway operation is required.

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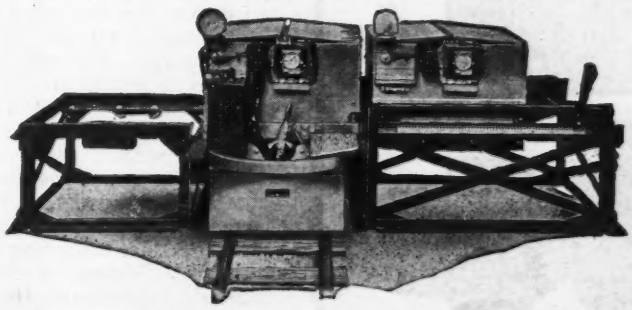
BATTERY CHANGING STATION



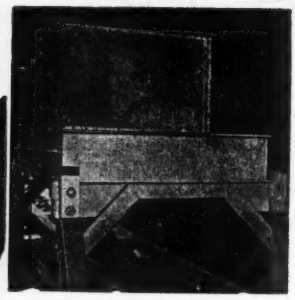
Change batteries in three to five minutes! With the ATLAS Battery Changing Station used batteries are rolled off the locomotive to one side of the station and a fresh battery is rolled on from the opposite side. Simple . . . compact . . . efficient . . . This unit makes a hard job easy!

Write for Bulletin No. 1226 contains complete details on the ATLAS Battery changing station.

Canadian Representative
Mine Equipment Company, Kirdland Lake, Ont.
International Agencies & Machinery Co. Ltd., Vancouver, B. C.
BMS Limited, Industrial Stand 223, Lower Germiston Rd. Jupiter, Johannesburg, So. Africa

THE ATLAS CAR & MFG. CO.
★ **CLEVELAND, OHIO, U. S. A.** ★

MERRICK WEIGHTOMETER



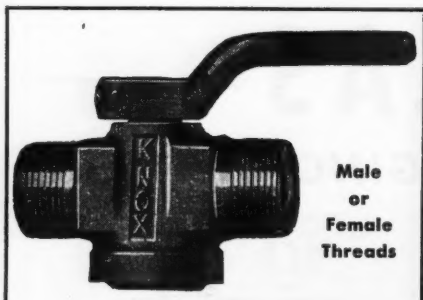
AUTOMATIC WEIGHING WITHOUT PAUSE IN CONVEYING!

The Merrick Weightometer provides a continuous, automatic accurate weight record while material is in motion on conveyor. It weighs without interrupting conveyor service.

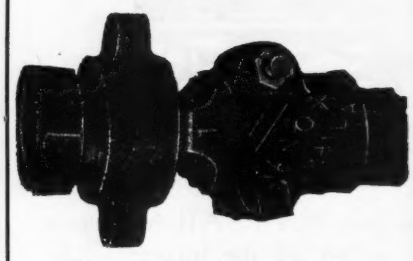
Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

Write for Bulletin 375

MERRICK SCALE MFG. CO.
PASSAIC, NEW JERSEY, U. S. A.



Male or Female Threads



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AUSTRALIA

Lake View & Star mine in good position—Aberfoyle Tin holds output—Report from Fiji

★Lake View & Star, Ltd., is the largest company operating on the Golden Mile, Kalgoorlie. Its property comprises the leases of the old Lake View Consols, Hannan's Star Consolidated, Chaffers, Ivanhoe Gold Corp., Golden Horseshoe, and Associated Gold Mines, which have been brought under the one control over a period of years. The total area now held is 722 acres and the capital of the company is £560,000. In the year ended June 30, 1943, net profit from mining was £389,378, of which £280,000 was set aside for taxation. Operations were severely restricted by shortage of labor, as were both development and ore extraction as well. It was also impossible to effect replacements to plant and machinery. The good results were largely due to the decrease in the broken-ore reserve, which it was impossible to maintain; to a reduction in development to 15 percent of the normal footage; and to the restriction of stoping to the upper levels as well as to a minimum of maintenance. Milling was carried on at 47 percent of full capacity, and the average number of employees, exclusive of staff, was 30 percent of normal. Development during the year amounted to 5,868 ft., or 34,000 ft. less than normal, but results were generally satisfactory. Ore reserves were estimated at 4,112,600 tons with an average grade of 5.01 dwt. per ton, which was a decrease of 87,600 tons and 0.04 dwt. in value compared with the figures for the previous year. Positive and broken ore amounted to 3,794,600 tons averaging 4.9 dwt. per ton, of the total reserves. The mill treated 321,509 tons of crude ore of an average value of 5.95 dwt. per ton for a record recovery of 91.48 percent. The residues re-treatment plant put through 827,201 tons of material having a head value of 0.84 dwt. per ton. Small changes were effected in the treatment plants to reduce manpower and increase efficiency. Shortage of many essential chemicals necessitated the use of inferior substitutes, but notwithstanding all difficulties creditable results were achieved. Average working costs were 21s. 8.64d. Stg. per ton, compared with 23s. 6.23d. in the previous year, the reduction being due to enforced restriction of development.

TASMANIA

★Aberfoyle Tin, N. L., Tasmania's largest lode tin and wolfram producer, is sinking the main shaft a further 240 ft. below No. 4 level. The company is working several north-striking, parallel lodes in slate and sandstone, no granite having been located so far, although there is a large granite mass in the vicinity. According to latest reports, the company has experienced the usual difficulties with regard to manpower, but, despite this, output has been maintained. Development has been confined to lateral work from existing levels, and ore reserves are estimated at 40,935 tons of proved ore and 11,627 tons of probable ore, the lodes being from 1 ft. to 5 ft. wide, with values of approximately 1.5 percent tin and 0.2 percent tungstic acid. It is anticipated that larger-scale mining and milling operations will be possible in the future, and to provide for this expansion, and improved work, alterations to the treatment plant are being made, and its ultimate replacement is intended.

VICTORIA

★Wattle Gully Gold Mines, N.L., at Chewton, about 30 miles south of the Bendigo gold field, has continued to operate successfully on a restricted scale. Work below No. 8 level has been suspended until conditions become normal, and mining is centered in the wide orebody above that horizon. The orebody is quartz, associated with a fault dipping west at about 40 deg., the stoping width is approximating 40 ft. The length being worked is 600 ft. Square-set stoping is the practice followed, with hydraulic filling, using a mixture of tailings and surface gravel, which sets well. Average grade of ore is 7 dwt. gold per ton. At present about 10,000 tons of ore is being treated per year, compared with 30,000 tons in 1941, and costs have risen from 33s. 13d. per ton in that year to 50s. 11d. per ton at the close of 1943. Ore is free-milling and the greater part of the gold is recovered by amalgamation. Wilfley tables and strakes are used to recover a pyritic concentrate, which accounts for about 1½ dwt. gold per ton of ore. Apart from future development at depth, when labor is available, there is scope for exploration above No. 8 level, north of the present workings. The company distributed 6s. per year in dividends for a number of years, and at the reduced rate of output, a rate of 2s. is expected to continue.

FIJI

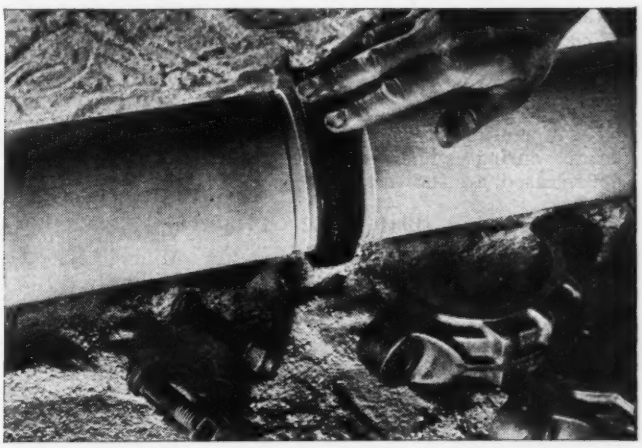
★After a lapse of three years, publication of production statistics of Fijian mining, which was discontinued under wartime regulations, has been resumed, and some description of Emperor Gold Mining Co., Ltd., and Loloma (Fiji) Gold Mines, N.L., over the period from June 30, 1940, to the close of the companies' financial years in June and July, 1943, respectively, has been issued. At Loloma (Fiji) Gold Mines, N.L., shortage of labor has greatly reduced development, with a consequent progressive shrinkage in ore reserves. In the 1943 period 184 men were employed, compared with 329 in the 1942 period, and ore reserves fell from 145,000 tons at Sept. 3, 1941, to 132,000 tons at the same date in 1942, and to

How to make a Leak-tight Pipe Joint . . . FAST!

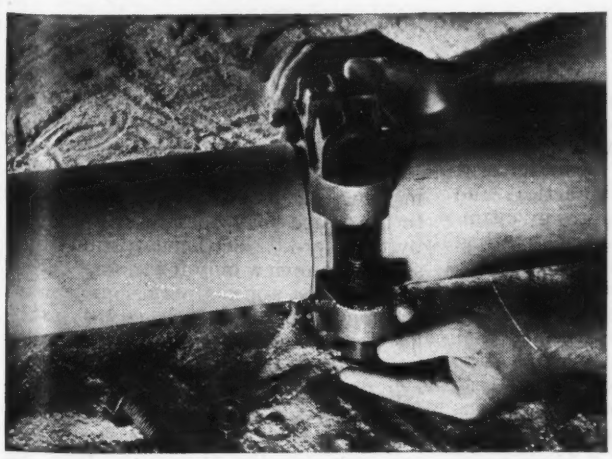
There's one sure way that eliminates all guesswork. It takes no special skill or training. It calls for no special equipment . . . only one small wrench is required. All you need is standard grooved pipe . . . and Victaulic Couplings. Here's what you do . . .

1 Your Victaulic Coupling is simple, fool-proof . . . a single gasket, two half-housings and two bolts only. Spread 'em out.

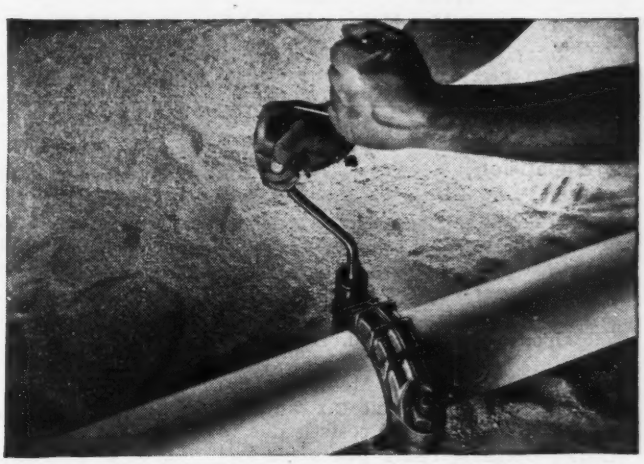
2 Slip gasket over one pipe and bring pipe ends together. (Don't worry about accurate alignment . . . the Victaulic Coupling permits angular deflection.)



3 Slide gasket into central position over pipe ends. (You're working up to a leak-tight, self-sealing joint . . . for either pressure or vacuum.)



4 Put on housings and insert bolts. You'll be surprised how little time you've taken until now.



5 Turn down the nuts until housings come together. That's all there is! And at each joint you have flexibility, expansion, a union, and a sure, safe lock . . . faster than you'd have thought possible!

BUY MORE WAR BONDS

VICTAULIC

Reg. U. S. Pat. Off.

SELF-ALIGNING PIPE COUPLINGS AND FULL-FLOW FITTINGS

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NEW VICTAULIC CATALOG MANUAL

. . . a must for every firm that uses pipe. Contains all you need know about Victaulic Couplings and Full-Flow Fittings. Write to nearest address for your copy today on your firm's letterhead. Victaulic Company of America, 30 Rockefeller Plaza, New York 20, N. Y.; Victaulic Inc., 727 West 7th St., Los Angeles 14, Calif.; Victaulic Co. of Canada, Ltd., 200 Bay Street, Toronto.

Australia (*Continued*)

114,900 tons in 1943, there being practically no variation in grade.

At September, 1943, estimated reserves were: positive ore, 94,400 tons assaying 22.9 dwt. gold per ton; probable ore, 20,500 tons assaying 13.8 dwt. gold per ton; total, 114,900 tons assaying 21.3 dwt. gold per ton. It has been necessary to suspend development work at the lower levels, Nos. 4, 5, 6, and 7, and in the past year the total completed was only 430 ft., compared with 4,034 ft. in the previous year. In exploratory work, 25 churn drill holes, totaling 7,082 ft., were put down to prospect for flat makes of ore. No values were met, but results indicated the necessity for further drilling. Underground diamond drilling comprised seven holes totaling 1,734 ft. By this work the Monarch lode was proved to persist but with low values, and the Regent lode was found to be valueless and to be dying out toward the north. Treatment operations over the past three years, during which statistics were not released, are shown below:—

Year ended	1941	1942	1943
Ore milled, long tons	33,308	28,962	17,323
Gold won, oz.	45,150	37,039	17,748
Silver won, oz.	12,179	9,797	4,887
Head value, gold, dwt. per ton	27.11	25.27	21.47
Residue value, dwt. per ton	1.04	1.08	0.97
Extraction, percent	96.14	95.93	95.49

Operating costs, in Fijian currency, per ton milled, for two years were:

Period	1942		1943	
Mining	14s.	11.4d.	23s.	9.8d.
Milling	29	6.8	43	9.6
General expenses	13	10.2	18	9.5
Total	58s.	4.4d.	86s.	4.9d.
Development redemption, ordinary	15	0	12	6
Development redemption, special	10	0	7	6
Total operating expenses	83s.	4.4d.	106s.	4.9d.

Costs are exclusive of Melbourne and London expenses, income tax, and depreciation. Increase in costs is due to smaller tonnage, rising prices for fuel oil, and for mining and milling requisites and higher wage rates.

★Emperor Gold Mining Co. Ltd., reported a similar decrease in labor to the adjoining Loloma mine, in the year to June, 1943. Employees decreased from 909 in 1942 to 585, of which number 418 were natives. Development totaled 1,465 ft., compared with 4,873 ft. in the previous period. Ore reserves were well maintained over the past three years. Total ore reserves in September, 1943, were 920,000 tons at 7.6 dwt. per ton. In 1942, reserves were 908,000 tons, and in 1941, 910,000 tons, grade showing little variation. During the past three years, production was as follows:

Year ended	1941	1942	1943
Ore milled, long tons	147,058	123,181	125,214
Gold won, oz.	52,547	45,766	41,094
Silver won, oz	13,081	13,442	17,141
Head value, gold, dwt. per ton	7.94	8.62	7.94
Residue value, dwt. per ton	0.89	1.19	1.37
Extraction: percent	88.05	85.47	82.93

It is proposed to sink the Wallace Smith shaft a further distance to No. 8, and possibly No. 10, level. In the open cut, 72,244 tons of overburden and waste was removed during the year. A survey of the open cut by churn drilling disclosed a considerable tonnage of oxidized and semi-oxidized ore assaying from 3 to 5 dwt. per ton, which will be mined during the present year. Operating costs in Fijian currency for two years, were:

Year	1942		1943	
Mining	6s.	7.77d.	7s.	2.45d.
Milling	16	8.84	18	6.66
General expenses	4	2.10	3	6.78
Total	27s.	6.71d.	29s.	3.89d.
Development redemption, ordinary	3	6.00	3	6.00
Development redemption, special	3	6.00	3	6.00
Total cost per ton	34s.	6.71d.	36s.	3.89d.

Costs are exclusive of Melbourne and London expenses, income tax, and depreciation. Ore from Emperor and Loloma mines will shortly be milled at the Emperor mill, which is being adapted for combined operation. It has been proved most practical and economical to treat both ores by cyanidation, followed by flotation, roasting, and cyaniding of concentrates. Improved recoveries can be made by the use of roaster gases for pulp conditioning prior to flotation. It is expected that a recovery of 92 percent will be made on a head value of 7 dwt., and that treatment costs under normal conditions will not exceed 14s. per ton. Milling has now been suspended at Loloma and certain units of the plant are being transferred to the Emperor mill.

U. S. Gold Output At Low Ebb

Production of gold in the United States during April amounted to 83,883 oz., against 83,809 oz. in March, and 139,741 oz. in April of last year, according to the American Bureau of Metal Statistics. Production in 1943 was 1,365,223 oz., which compares with 3,618,503 oz. in 1942 and 5,980,746 oz. in 1941.

Reflections From Washington

(*Continued from p.* 103)

The act further states that the director shall require each contracting agency to formalize all such obligations.

The addition of the War Production Board to the list of contracting agencies and the language of Section 17 quoted in part in the foregoing is thought to bring the operations of the Premium Price Plan under the terms of the act. These paragraphs might also be interpreted to cover any written or spoken word of any employee of a WPB metal or mineral division, and thus might lead to a great number of claims.

The law establishes a new Office of Contract Settlement headed by a director to be appointed by the President and confirmed by the Senate. To insure uniformity in administration, the director "shall prescribe policies, principles, methods, procedures and standards" for all government agencies operating under its terms. A Contract Settlement Board is to be established "with which the director shall advise and consult." The board is to be made up of representatives of the Army, Navy, Treasury, Maritime Commission, Foreign Economic Administration, Reconstruction Finance Corp., War Production Board, Smaller War Plants Corp., and the Attorney General.

On the termination of a contract, the procurement agency arranges the settlement. Each contracting agency establishes its own standards and methods that are to be the basis on which settlement is to be made. If the amount involved is more than $50,000, the settlement will be reviewed by a board of three or more members set up by the contracting agency in the regional or district office where the settlement is made. "Failure of the Settlement Review Board to act upon any settlement within 30 days after its submission to the board shall operate as approval by the board." Settlement is final and subject to review only for fraud.

Under the appeals provisions, a war contractor who is dissatisfied may take his case either to a special appeals board established under the act or may bring suit against the United States in the U.S. Court of Appeals.

As there is nothing in the law specifying how stiff the accounting requirements are to be, no one can tell at this early date how the act will be administered or whether the War Production Board can properly be called a contracting agency. Mining men in Washington who have been questioned say that they will be satisfied if mine operators are accorded the same treatment as manufacturers. Some are afraid that the Contract Settlement Act of 1944 does little more than grant the doubtful privilege of going to court. In short, much depends on the skill and sincerity exercised in administration.

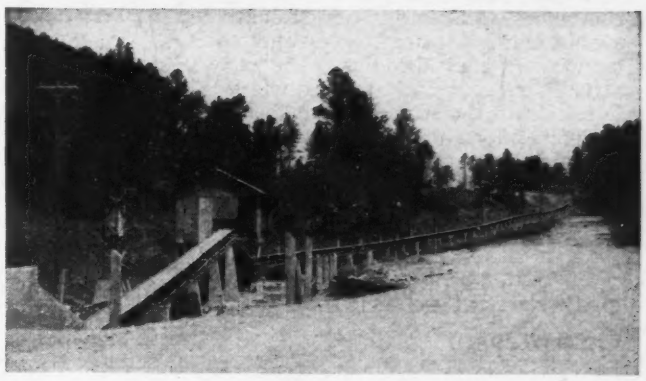
The Act takes effect on July 21st.

They HAD a problem - -

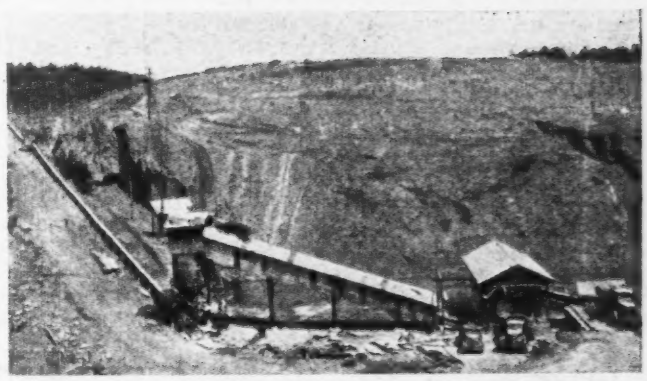
When the National Cement Co. at Ragland, Alabama, decided to open a new quarry, they were confronted with the problem of moving crushed rock one and a quarter miles to the mill stock pile. Since this quarry was being opened at the time when the war effort was getting under way, they were also faced with possible tire and gasoline rationing as well as labor shortage. This prospect made it necessary to find a substitute for their rail and truck haulage.

We HAD the solution

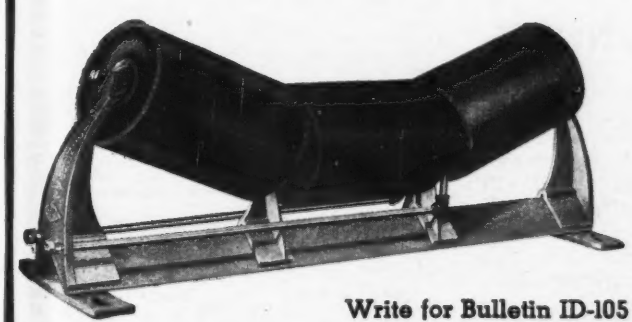
First, all methods of haulage were considered. Then the management, with the help of Continental engineers, designed a belt conveyor system which hauls over 200 tons of crushed rock per hour at a fraction of a cent per ton—many times the capacity and at a very small portion of the cost of their former system. In all, seven main conveyors are used. Overall centers are based on the topography but all are equipped with the same size motors and drives for interchangeability.



Continental engineers supplied all necessary topographical surveys and maps and designed the conveyor system, the concrete piers supporting it and all other concrete structures involved.



CONTINENTAL
BELT CONVEYOR
IDLERS



Write for Bulletin ID-105

Continental idlers are made in a complete range of sizes with steel, cast iron or rubber covered rolls for every type of service. All idlers are equipped with anti-friction bearings protected by labyrinth seals and amply supplied with lubricant by large grease reservoirs.

A complete line of belt conveyor accessories combined with engineering "know how" provides Continental with the means of solving your conveying problem too.

FOR THE WAR EFFORT

ARMY E NAVY

★ ★ ★ ★

Pennant awarded
October, 1941
1st renewal (Star)
May, 1942
2nd renewal (Star)
October, 1942
3rd renewal (Star)
April, 1943
4th renewal (Star)
December, 1943

INDUSTRIAL DIVISION

CONTINENTAL GIN COMPANY

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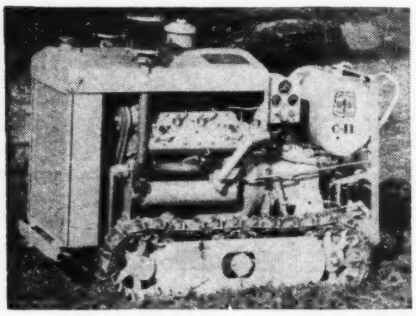
EQUIPMENT NEWS

Crane Stability Gage

A new crane stability gage for use on boom-type cranes and similar equipment has been announced by the Special Products Division of General Electric Co., Schenectady, N. Y. The new gage safeguards the machine, by continuously measuring its stability, against taking on loads in excess of rated capacity at a given radius. The gage actually measures the amount of deformation in the structural member of the crane, upon which a strain gage is mounted, and automatically translates this reading to a stability indicator in the cab.

Self-Propelled Air Compressor

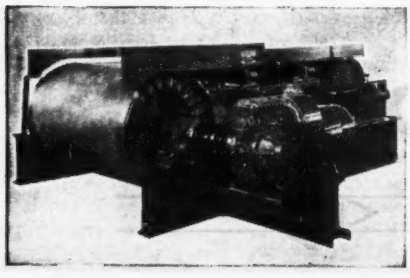
Schramm, Inc., West Chester, Pa., builds the self-propelled portable air compressor shown above. Its capacity is 60 cu.ft., and the manufacturer



says that it can be transported under its own power over the roughest kind of terrain. Complete specifications of the unit will be found in Schramm catalog No. 4215.

Largest Magnetic Pulley

What is considered to be the largest magnetic pulley ever built into a pulley-type separator was recently provided by Dings Magnetic Separator Co., Milwaukee, Wis., for removal of tramp iron from mine-run coal in a preparation plant. Shown in the accompanying photograph, the unit is 36 in. in diameter and has a 63 in. face. It weighs over 17,000 lb. and has a capacity of 450 tons per hour.



Improved Insulation On Electrode Holder

A new type of insulator for their tong-type arc welding electrode holders has been announced by Jackson Products, Detroit, Mich. The manufacturer claims that new metal-clad jaw covers increase holder life, and that the new arched construction assures greater strength and deflects heat and weld spatter. Air ducts are provided in the new unit, which is interchangeable with all Jackson insulated holders now in service.

Caterpillar Tractor Expands Product Line

In addition to its line of tractors, graders, and diesel engines, Caterpillar Tractor Co., Peoria, Ill., announces that it will hereafter manufacture a complete line of bulldozers, scrapers, rippers, and cable-controlled units. In the past, such units have been furnished by other manufacturers for use with Caterpillar tractors. Through this change, the Caterpillar company believes that it will be better able to match properly the construction and capacity of units that must subsequently work together when sold.

INDUSTRIAL NOTES

Army-Navy "E" awards, or renewals of existing awards, have been given to the following plants **Nordberg Mfg. Co.,** Milwaukee, Wis., the fourth renewal; **Caterpillar Tractor Co.,** Peoria, Ill.; **Manhattan Rubber Mfg. Division,** Passaic, N. J.; **Phelps Dodge Copper Products Corp.,** Yonkers, N. Y., third renewal; **Whiting Corp., Harvey, Ill.**

Eimco Corp., Salt Lake City, Utah, announces that its Eimco loader will hereafter be known as the **Eimco Rocker Shovel.**

Fred H. Haggerson has been elected president of **Union Carbide & Carbon Corp.,** succeeding **Benjamin O'Shea,** who becomes chairman of the board. **Ralph R. Browning, Paul R. Huffard,** and **Homer A. Holt** were elected as directors. **Stanley B. Kirk** is now president of **Linde Air Products Co.,** **Francis P. Gormely** is president of **Electro Metallurgical Co.,** and **John D. Swain** is president of **Electro Metallurgical Sales Corp.** All of these companies, and several associated firms, are **Union Carbide** subsidiaries.

Stanley M. Moos, Mexico City, has severed his connection with **Denver Equipment Co.** and will henceforth represent the following firms: **Western Machinery Co., U. S. Electrical Motors, Inc., Alloy Steels & Metals Co.,** and **Hardinge Co., Inc.** He will specialize in design and construction of ore dressing plants, working in cooperation with the staff of **Western-Knapp Engineering Co.** His address is Edificio Independencia, Dolores 16–308, Mexico, D. F.

J. F. Mitchell-Roberts, manager of the foreign and export division of **Oliver United Filters, Inc.,** is resigning his position with the company.

A. R. Teifeld has become advertising manager for **Copperweld Steel Co.,** Glassport, Pa. Mr. Teifeld was formerly connected with **American Steel & Wire Co.,** Cleveland, Ohio.

Charles S. Lincoln, chief designer of the crushing, cement, and Mining divisions of **Allis Chalmers Mfg. Co.,** died on May 24.

BULLETINS

Mine Track Ties. Koppers Co., Wood Preserving Division, Pittsburgh, Pa., has released a booklet describing its steel-capped treated wood ties for use in mine haulage systems.

Welding Safety. American Standards Association, 29 West 39th St., New York 18, N. Y., has prepared a 32-page booklet dealing with every phase of safety applicable to electric and gas welding and cutting operations. Price of the book is 40 c. per copy, but the rate is reduced on large orders.

Water Coolers. What amounts to a refresher course in problems of water cooling and waste-heat recovery is furnished by a new 38-page booklet published by the Marley Co., Inc., 3001 Fairfax Road, Kansas City, Kan. Every phase of industrial use of water for cooling purposes is explained simply and pictorially.

Car Unloaders. Portable car unloading equipment and portable scraper conveyors are described in new bulletins just published by Jeffrey Mfg. Co., Columbus 16, Ohio.

Quartz Crystals. "How Quartz Crystals Are Manufactured" is the title of a new booklet now available from North American Philips Co., Inc., 100 East 42d St., New York 17, N. Y.

Compressors and Vacuum Pumps. Ingersoll-Rand Co., New York, N. Y., has published a new 32-page catalog of air compressors and vacuum pumps in sizes from ½ to 10 hp.

Magnetic Laboratory Equipment. A complete description of equipment for laboratory work in magnetic separation can be obtained from Dings Magnetic Separator Co., 509 E. Smith St., Milwaukee 7, Wis.

Mine Track Tackle. Portable Lamp & Equipment Co., Pittsburgh 19, Pa., is offering a 4-page folder dealing with its entire line of mine track equipment.